

The impact of private hosting on the integration of Ukrainian refugees in Germany

Received: 10 April 2024

Accepted: 6 August 2025

Published online: 10 September 2025

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Amid the Ukrainian displacement crisis, private hosting of refugees in Europe has surged, yet its impact on integration remains understudied. This research examines the short- to medium-term effects of private hosting on Ukrainian refugee integration in Germany. Using data from one of the largest non-profit platforms that matches private hosts with refugees, we compare the multidimensional integration outcomes of refugees who were matched with private hosts to those of observably similar refugees who applied for private hosting but were not matched ($n = 1,700$). Our findings show significant improvements in the social, psychological and navigational integration of privately hosted refugees, with no discernible effects on linguistic, economic or political integration. This study provides causal evidence on the effectiveness of private hosting in enhancing refugee integration, underscoring its potential to complement traditional public asylum reception and housing systems, and to harness civil society engagement for refugee integration during humanitarian crises.

European countries have grappled with significant humanitarian crises in recent years. In 2015, over 1.2 million individuals, predominantly from Syria, Afghanistan and Iraq applied for asylum in Europe¹. More recently, since 2022, over 11 million Ukrainians were displaced, with around 6 million seeking refuge across Europe following the Russian invasion². The sudden arrival of many refugees overwhelmed the traditional European asylum reception system, which usually relied on housing refugees and asylum seekers in public reception centres and shelters³. To accommodate the large number of arrivals, some European countries resorted to housing Ukrainian refugees in makeshift container camps or military facilities^{4,5}.

The displacement of Ukrainians marked a significant shift in how European host countries responded to mass displacement events. For the first time in history, the Council of the European Union invoked its Temporary Protection Directive⁶, immediately granting

Ukrainian refugees temporary protection status and, for example, the freedom to choose their place of residence within the European Union⁷. This crisis also triggered the rapid emergence of large-scale private hosting initiatives to address the unprecedented demand for refugee housing.

While private hosting initiatives for refugees have existed in Europe for decades, they had typically operated on a small scale. There was increased interest in such initiatives during the refugee crisis in the mid-2010s, but it was only with the Ukrainian displacements that private hosting emerged on a large scale^{8,9}. In a short time span, civil society organizations and sometimes governments, created platforms to connect refugees in need with local residents who volunteered to host them in their homes. While hosting arrangements varied across different contexts, hosts typically had no previous personal connection to the refugees. They often shared their homes with refugees and

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provided housing for free without a set time limit. Survey estimates suggest that within the first few months after the Russian invasion in February 2022, about 27% of Ukrainian refugees in Europe were privately hosted¹⁰.

The swift rise of large-scale private hosting alongside the traditional public asylum system represents a significant policy innovation in responding to humanitarian protection crises. Private hosting has the potential to complement the often overwhelmed government reception systems when faced with a sudden increase in refugee arrivals. It also taps into the goodwill of civil society to assist in welcoming refugees and mobilizes the resources and solidarity of private citizens. However, despite its importance, there is a lack of research on the private hosting of refugees. Previous work has documented the increase in private hosting and the motivations of hosts⁹, examined the activities of hosts^{11–13} or explored alternative models such as private refugee sponsorship and co-sponsorship^{14–17}. Yet, there is a paucity of systematic quantitative research that examines the causal impacts of private hosting on the lives of refugees. This is particularly important because private hosting occurs at the crucial moment when refugees arrive in a host country and research has shown that early interventions often have a disproportionately large impact on long-term integration outcomes^{18–21}.

In this study, we aim to fill this gap by investigating the impact of private hosting on the multidimensional integration outcomes of refugees. In particular, we seek to provide evidence on the following research questions: Did private hosting result in extensive interactions between refugees and their private hosts and what kind of support did hosts provide to refugees? How does being privately hosted affect the multidimensional integration success of refugees? Do the impacts of private hosting vary depending on the dimension of refugee integration, that is, social, economic, political, linguistic, psychological and navigational integration? How do the effects of private hosting vary among different groups of refugees? How does private hosting compare with the specific alternatives of living in public refugee housing or a private rental without a host? What mechanisms might explain the impacts of private hosting on integration? Providing systematic evidence on these questions is of first-order importance for both policy and theory, given the paucity of research on the impacts of private hosting on integration.

Our empirical investigation is guided by the theoretical expectation that the effect of private hosting on refugee integration is theoretically ambiguous. On the one hand, it could improve the integration of refugees through various mechanisms. Being hosted in a private home might provide a softer landing for refugees compared with the stress they may experience in large and often overcrowded public shelters²². Hosting may also result in positive intergroup contact where native hosts and refugees interact over an extended period of time. Even though hosts have no formal responsibility to do so, they may act as brokers in facilitating the social, institutional and cultural on-boarding of refugees to the new country. Hosts may leverage their social capital and networks to help refugees find friends, jobs or long-term housing. Hosts may also use their know-how and language skills to help refugees navigate the local bureaucracy and facilitate access to healthcare, education and social services. These benefits of positive contact may contrast with social isolation that refugees could experience if they just rent private accommodation without contact to a host. Lastly, private hosting may also result in refugees being housed in areas that are more welcoming and diverse, which can facilitate successful integration^{23,24}.

On the other hand, being hosted by a private household may come with its own challenges and potentially reduce the integration success of refugees. Such arrangements may lead to conflicts between refugees and hosts, particularly if there are misaligned expectations about the roles of hosts and guests, power imbalances, lack of respect for boundaries or if the hosts' compassion wanes over time. Furthermore, there have been concerns raised in several newspaper articles about

the risks of refugees being exploited by unscrupulous hosts and, in some cases, refugees have had to be removed from unsuitable hosting situations^{25,26}. Even when hosts have good intentions, they typically lack specialized training or prior experience in receiving refugees and may therefore be ill-equipped to adequately assist refugees in navigating complex bureaucracy and accessing necessary support, in contrast to professional case-workers in public reception facilities. Finally, because private hosting is entirely based on the goodwill of the host, it may introduce a high degree of unpredictability for refugees if hosts suddenly withdraw their support⁸.

In theory, the effect of private hosting may also vary depending on the dimension of integration^{27–29}. For instance, if a refugee experiences negative interactions with a low-quality private host, they may become disconnected from the society of the host country, potentially resulting in diminished psychological and social integration. Conversely, a positive experience may foster a sense of belonging, thereby leading to an increase in psychological and social integration. Additionally, we may observe more pronounced effects on social, psychological and navigational integration in the short to medium term, while impacts on linguistic, economic, or political integration may take longer to manifest due to the time required for activities such as learning German or improving employment and income in Germany.

To provide evidence on the impact of private hosting on refugee integration, we leverage data from #UnterkunftUkraine (UU), one of the largest digital platforms for private hosting of refugees in Germany and Europe¹¹. UU emerged shortly after the Russian invasion of Ukraine in February 2022 and had registered over 160,000 potential hosts of whom around 30,000 completed a verification process. Through 25,400 matches between a host and a refugee household, UU matched over 60,000 Ukrainians to privately hosted accommodations in Germany (Supplementary Information Section 1).

Drawing upon the registration data from the UU platform we conducted an original survey of refugees who had applied to be matched with a private host and measured their multidimensional integration success, including economic, social, psychological, political and navigational integration²⁹. To identify the effect of being privately hosted, we compare refugees who were matched to a host by UU to observably similar refugees who applied but did not get matched. Since we observe and control for the same refugee characteristics that were used by UU to conduct the matching we can identify the causal effect of hosting under a credible selection-on-observables assumption³⁰. In other words, once we control for the same characteristics visible to UU at the time when they conducted the matching, we minimize the possibility that matched and unmatched refugees systematically differ in unobserved confounding characteristics that may impact their integration outcomes. This expectation is supported by balance checks.

Using the survey-based measures of integration, we find that being hosted by a private household improved the integration of Ukrainian refugees compared with similar refugees living in various other types of accommodations, but the impacts were concentrated in specific dimensions of integration. For most respondents, the survey captures integration outcomes more than a year after their arrival in Germany, so that we can consider our estimates to cover short- to medium-term effects. When looking at the overall multidimensional integration index (twelve item Immigration Policy Lab integration index, IPL-12) we find that being privately hosted improves the summary index by about one-fifth (intention-to-treat effect (ITT)) or half (local average treatment effect (LATE)) of a standard deviation. These gains are concentrated in terms of social, psychological and navigational integration outcomes. We find no discernible effects on economic, political or linguistic integration. The patterns of effects were robust across various models and stable among diverse refugee subgroups.

Additionally, we examine how the effects of private hosting compare specifically to living in public refugee housing or in privately rented accommodations. Our findings indicate that the effects of

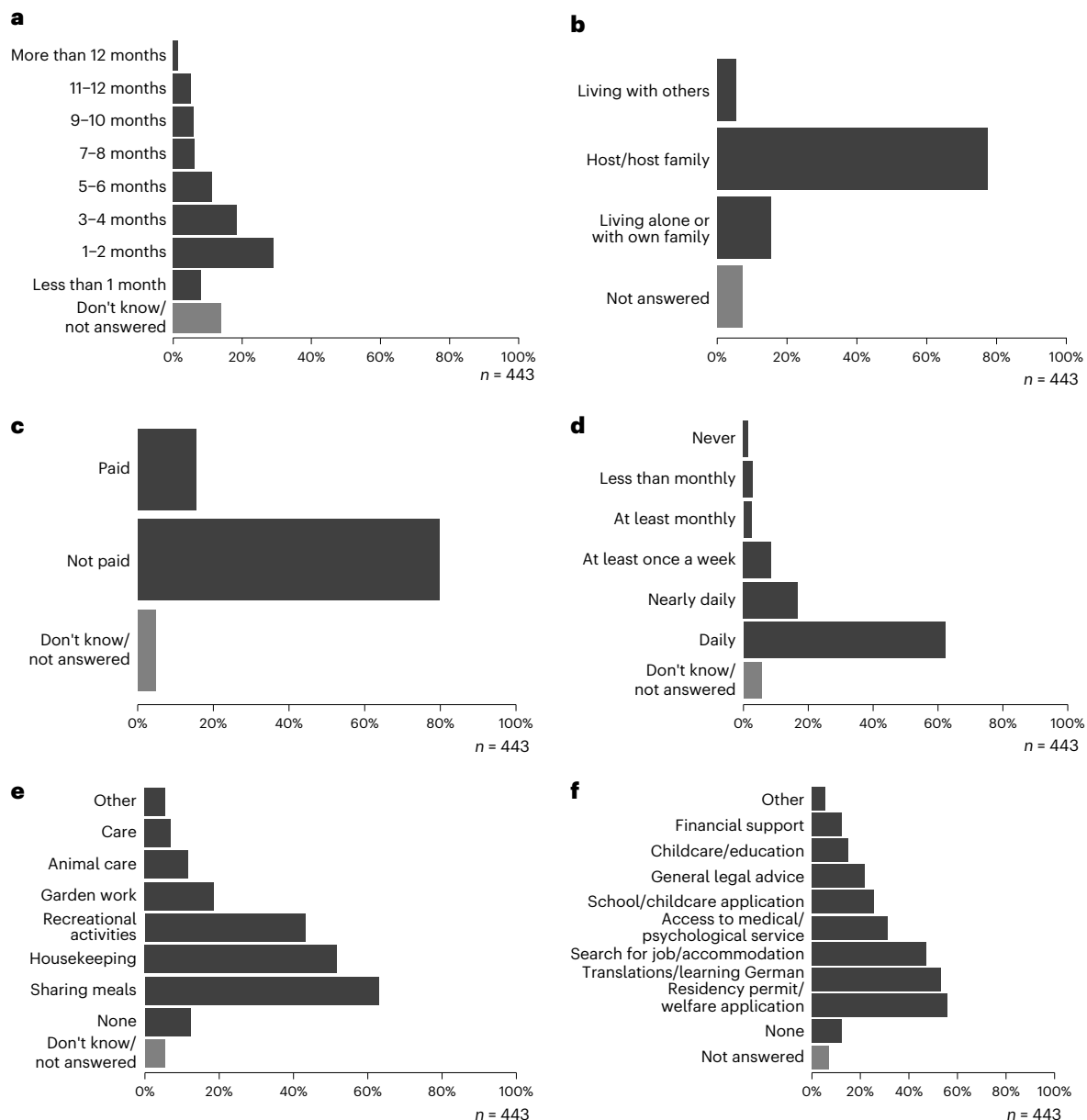


Fig. 1 | Reported experiences of survey respondents in privately hosted accommodation facilitated by the UU platform. a, The duration for which refugees stayed in privately hosted accommodation. **b**, Shows whether the refugees lived in the privately hosted accommodation with people from outside their family and whether these people were the hosts of the accommodation. **c**, Shows whether the refugees have paid money to the hosts for staying in the

accommodation. **d**, The communication frequency between the refugees and the hosts during the refugee's stay in the privately hosted accommodation. **e**, Joint activities between refugees and hosts during the refugee's stay in the privately hosted accommodation. **f**, Forms of support the refugees received from the hosts. All panels show weighted data.

private hosting remain consistent when compared with either of these conditions, suggesting that private hosting can generate integration benefits compared with both of these main housing alternatives for refugees.

Taken together, our study contributes systematic evidence on the causal impacts of private hosting on the integration of refugees. Our results demonstrate that, at least in the context of refugees matched through the UU platform, private hosting can lead to improved integration outcomes in some important dimensions, while having no effect on other dimensions. This information is critical for policy-makers as they plan responses to humanitarian crises in Europe and beyond, demonstrating that engaging civil society can relieve the burden on the public asylum system and contribute to successful refugee integration.

Results

In this study, we focus on the impacts of private hosting of refugees, a practice that became prevalent during the Ukraine displacement crisis. In our context, private hosting refers to local residents in the host country offering temporary, typically cost-free lodging to refugees in need of housing. Specifically, we examine private hosting facilitated by the non-profit matching platform UU.

Figure 1 illustrates key statistics that provide insights into the duration of stay in the privately hosted accommodation and the level of support received by refugees who were matched with a private host through UU. On average, refugees stayed in the accommodation for approximately 4 months, with a range spanning from 1 to 2 months to over 12 months (Fig. 1a). In 78% of cases, the host cohabited with the refugee in the same dwelling, while in 80% of cases, the accommodation

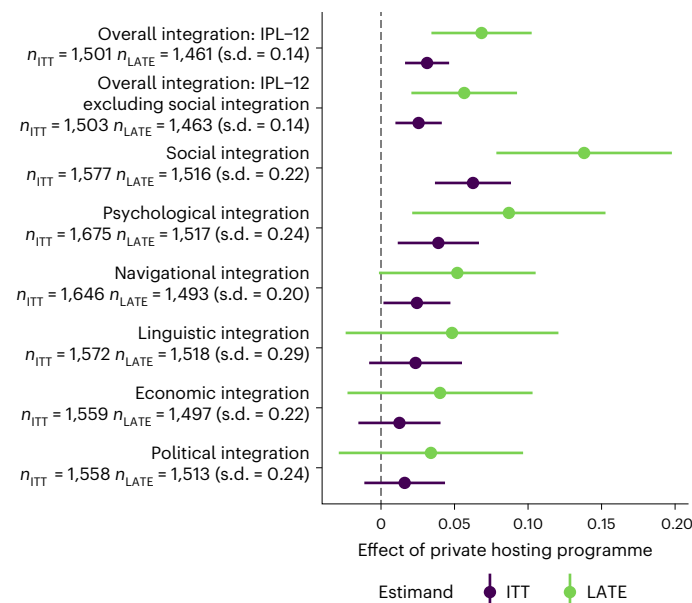


Fig. 2 | Private hosting enhances refugee integration. The figure shows estimates from ordinary least-squares and two-stage least-squares regressions with non-response weights, all main covariates (Supplementary Tables 11, 12, 15 and 17) and heteroscedasticity-robust 95% CIs. To help with the interpretation of the point estimates, we report the standard deviation of each outcome.

was provided to the refugee at no cost (Fig. 1b,c). A substantial 61% of refugees maintained daily contact with their host, engaging in joint activities such as sharing meals, housekeeping and recreational pursuits (Fig. 1d,e). Additionally, hosts frequently assisted refugees with tasks such as residency and welfare applications, translations, job searches, accessing medical services and enrolling in school and child-care, among other forms of support (Fig. 1f).

These findings collectively highlight that refugees who received private hosting experienced extensive interactions with their hosts and often received direct support in their integration journey. As we show in the Supplementary Table 19, we find a similar pattern regarding the interactions with hosts when comparing refugees who were matched with those not matched by UU. In particular, refugees who were matched are much more likely to live with hosts, less likely to live with other refugees and less likely to pay rent compared with refugees who were not matched to a host. In the same table we also demonstrate that matched refugees are less likely to be in private rentals and public housing compared with unmatched refugees.

How does being privately hosted via the UU platform affect the integration success of refugees? Figure 2 presents the main results (Supplementary Table 11, column 5, gives numerical estimates), including effect estimates for being matched (ITT) and being privately hosted (LATE) on the IPL-12, as well as each of the six dimensions of integration. Note that the partial first-stage *F* statistics for the LATE models range between 330 and 460 indicating that the instrument is sufficiently strong (Supplementary Table 11).

The study indicates that being privately hosted resulted in significant enhancements in the overall IPL-12 index, with an increase of approximately 0.03 points (with a 95% confidence interval (CI) ranging from 0.02 to 0.05, $P < 0.001$) for ITT and 0.07 points (CI [0.03, 0.10], $P < 0.001$) for LATE. These improvements are of notable magnitude. To provide context, given that the standard deviation of the IPL-12 index in the sample is 0.14, the effects of private hosting translate to an increase of about 20% of a standard deviation units for ITT and about 50% for LATE.

When examining the six dimensions of integration individually, substantial gains were observed in social, psychological and

navigational integration. Specifically, based on ITT estimates being privately hosted led to an increase of 0.06 points in social integration (equivalent to an 31% standard deviation unit increase, [0.04, 0.09], $P < 0.001$), 0.04 points in psychological integration (a 16% standard deviation unit increase, [0.01, 0.07], $P = 0.006$) and 0.02 points in navigational integration (a 10% standard deviation unit increase, [0.00, 0.05], $P = 0.04$). As for linguistic, economic and political integration, the effects did not reach statistical significance at conventional levels (Supplementary Tables 15 and 17, column 5). Lastly, we also find sizeable effects when we consider the overall IPL-12 index but excluding the social integration dimensions, with gains of 0.03 (ITT, [0.01, 0.04], $P = 0.001$) and 0.06 (LATE, [0.02, 0.09], $P = 0.002$), respectively (Supplementary Table 12, column 5). In summary, these results highlight that private hosting improves the integration of Ukrainian refugees with the most pronounced benefits observed in the social, psychological and navigational dimensions of integration, but no discernible gains in linguistic, economic and political integration. Since we measure integration outcomes for most refugees more than a year after their arrival in Germany, the ITT and LATE estimates cover short- and medium-term impacts of private hosting.

Several robustness checks support the resilience of the effect estimates. Notably, the estimates remain robust when removing the poststratification weights, adding additional covariates (Supplementary Tables 11, 12, 15 and 17), using double/debiased machine learning estimators (Supplementary Table 25) and excluding other dimensions from the overall IPL-12 index (Supplementary Tables 13 and 14). We also conduct a series of placebo balance checks and find that they support our selection-on-observables assumption suggesting that matched and unmatched refugees are unlikely to differ on unobserved confounders (Supplementary Information Section 2.11). Lastly, we conduct a formal sensitivity analysis suggesting that the results are robust to potential hidden bias; an unobserved confounder would have to be more than six times stronger than the strongest observed selection covariates (refugee reports speaking English or German) to overturn our effects (Supplementary Information Section 3.4).

Effect heterogeneity

An important question for both theory and policy pertains to whether the effects of private hosting vary among different groups of refugees. One potential concern is that because of the limited experience of hosts with refugees, the impact of private hosting may result in highly variable effects, contingent upon the quality of the host or the compatibility of the match between the refugee and the host. To delve into this enquiry, we conducted a series of analyses to examine potential treatment effect heterogeneity.

The results, shown in Fig. 3a, reveal that the conditional ITT effects of private hosting remain highly consistent across subgroups of refugees, stratified by factors such as gender, age, education and marital status. In Supplementary Table 18 we report regression models including an interaction between the matching indicator and the relevant subgroup indicator. Across all these models, the coefficient for the interaction term is insignificant. However, using an equivalence test, we are unable to accept the null hypothesis of no heterogeneity as the CIs for the interaction effects are not fully covered in the region of practical equivalence. Following ref. 31, we define region of practical equivalence as $\pm 10\%$ of the standard deviation of the dependent variable. The corresponding equivalence *P* values, that is, the area of the (cumulative) confidence distribution that is outside of the region of equivalence, are $P = 0.68$ (gender), $P = 0.45$ (age), $P = 0.38$ (education) and $P = 0.47$ (marital status). Importantly, we also note that there is no evidence to suggest that private hosting has adverse consequences for specific subgroups.

In terms of policy, this stability across subgroups suggests that the positive effects of private hosting are broadly shared among Ukrainian refugees and are not concentrated within specific subsets. From a

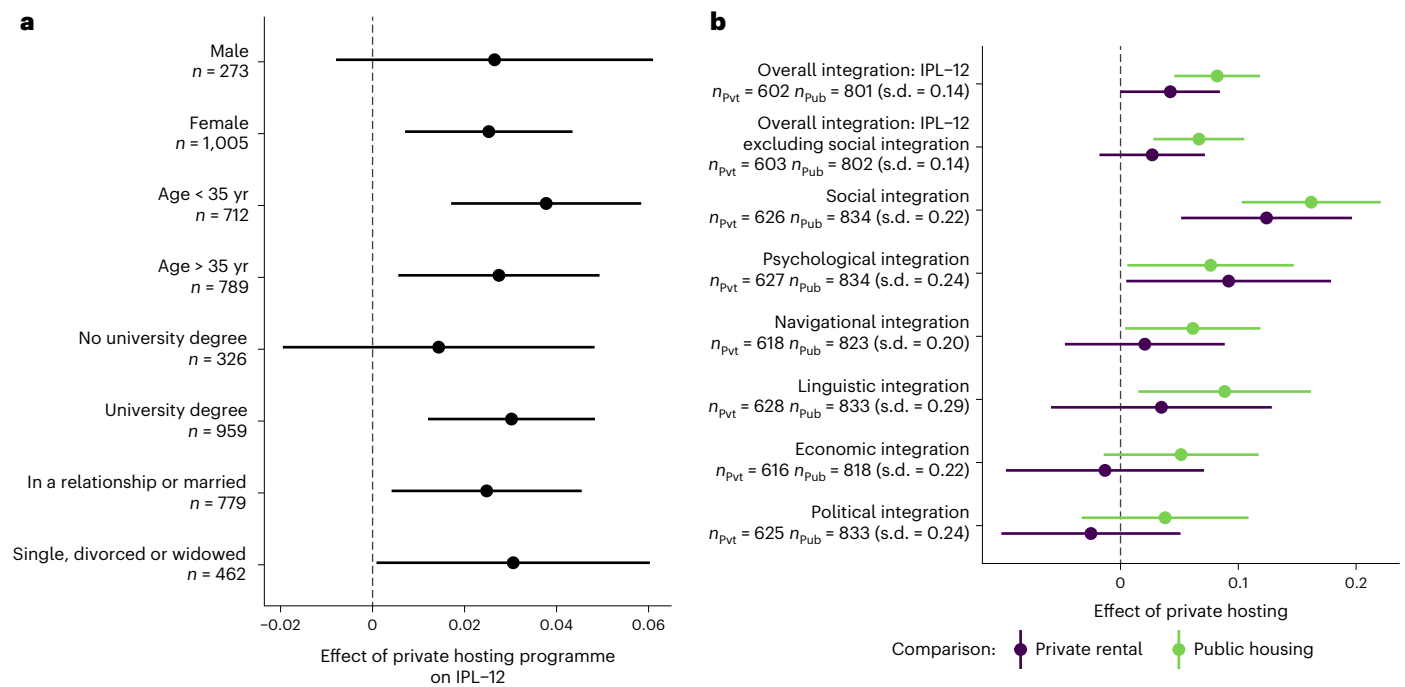


Fig. 3 | The effect of private hosting is stable across refugee subgroups and alternative housing arrangements. a, Private hosting has similar effects across different demographic subgroups. The ITT estimates are from subgroup-specific ordinary least-squares regressions with non-response weights, all main covariates (Supplementary Table 18b) and 95% heteroscedasticity-robust CIs. **b,** Private hosting facilitates integration when compared with refugees

in public housing or private rentals. LATE estimates from two-stage least-squares regression estimates with non-response weights, all main covariates (Supplementary Tables 23 and 24) and 95% heteroscedasticity-robust CIs. Subscripts: Pvt, sample size for estimation of effect of private hosting versus private rental; Pub, sample size for estimation of effect of private hosting versus public housing. Note that x-axis scales differ between **a** and **b**.

theoretical perspective, the consistency in the effects suggests that the impact of private hosting operates through a common mechanism rather than mechanisms that are specific to particular refugees.

Hosting versus public housing and private accommodations

The effect estimates thus far show that refugees who were privately hosted achieved higher integration success compared with those who were not. This comparison quantifies the overall impact of being privately hosted versus all alternative housing arrangements, including refugees housed in public asylum centres and those who rented private accommodations independently.

In this analysis, we specifically compare private hosting with the two main alternative control conditions: living in public refugee housing, which includes both asylum centres and other public refugee accommodations, and living in privately rented accommodation without a host. To facilitate these comparisons, we replicate the baseline models, focusing on the effects of being privately hosted, but restrict the control group to only those refugees who lived in public refugee accommodations or privately rented accommodations.

The results of these two comparisons are shown in Fig. 3b (also Supplementary Tables 23 and 24, column 5). We observe that the effects of private hosting remain stable when compared with either living in public refugee housing or in privately rented accommodations. Specifically, private hosting led to a significant improvement in the integration success of refugees, as measured by the overall IPL-12 index, by approximately 0.08 points compared with public housing ([0.05, 0.12], $P < 0.001$) and by about 0.04 points when compared with privately rented accommodations ([0.00, 0.08], $P = 0.049$). While the point estimates for the effects of private hosting are larger when compared with public refugee housing than to private rentals, the differences are not statistically significant.

Overall, the consistency of the effects of private hosting across both control conditions highlights the robustness of the estimates

and suggests that private hosting can generate integration benefits compared with both the main housing alternatives. One interpretation of this is that private hosting may enhance integration by providing refugees with a softer landing and reducing the stress associated with crowded public refugee housing facilities. Additionally, private hosting offers refugees frequent social contact with their hosts, which could facilitate integration more effectively than the potential social isolation they may experience if they rent private accommodation independently.

Contact or location mechanism

What mechanisms might explain the positive impacts of private hosting on integration? In this section, we conduct additional analyses to differentiate between two classes of mechanisms: those related to location and those associated with contact. One possible mechanism suggests that the effect of private hosting stems from the fact that matching refugees with private hosts leads to them being placed in more welcoming or diverse neighbourhoods, which in turn may facilitate successful integration^{32,33}. An alternative mechanism proposes that the effect of private hosting is driven by the positive contact refugees have with their hosts and the support they receive from them. Note that these mechanisms are not mutually exclusive and may even reinforce each other.

To examine the location mechanism, we replicate our models and assess the ITT effects of matching on various location characteristics where refugees settled (measured at the municipality level; for details, refer to Supplementary Information Section 2.2.4). The results, as shown in Fig. 4a (also Supplementary Tables 20 and 21, column 5) do not support the idea that the positive effects of private hosting are due to refugees being directed to more hospitable areas. In fact, the estimates suggest that the locations where matched and unmatched refugees live are similar on average in terms of vote share for the far-right party Alternative for Germany (AfD) (equivalence P value using $\pm 10\%$ as region of practical equivalence as above: $P = 0.28$),

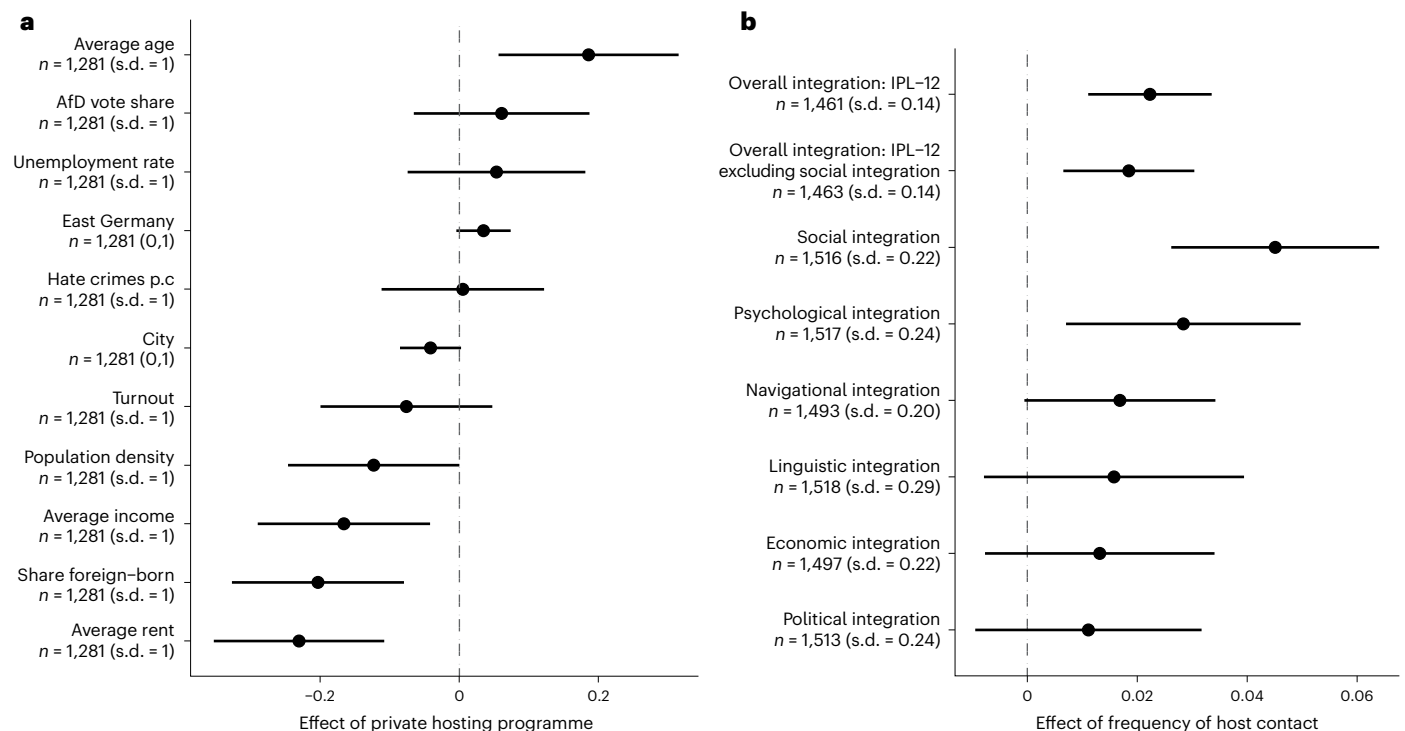


Fig. 4 | Mechanisms of private hosting: location vs. contact. a, Refugees in private hosting are not more likely to live in more welcoming and diverse areas. ITT analysis estimates from ordinary least-squares regression with non-response weights, all main covariates (Supplementary Tables 20 and 21) and 95% heteroscedasticity-robust CIs using location characteristics where refugees

settled as outcomes. **b**, Higher frequency of contact with host is associated with larger gains in integration. LATE estimates from two-stage least-squares estimates with non-response weights, all main covariates (Supplementary Table 22) and 95% heteroscedasticity-robust CIs. Note that the x-axis scales differ between **a** and **b**. p.c., per capita.

hate crimes per capita ($P = 0.09$), unemployment rates ($P = 0.25$), voter turnout ($P = 0.35$), city status ($P = 0.60$) and whether the area is located in East Germany ($P = 0.60$). Interestingly, refugees matched with private hosts tend to live in areas with slightly lower average incomes, lower average rents, higher average age, lower population density and a smaller share of foreign-born residents. These differences are unlikely to facilitate integration. Furthermore, we find no significant correlation between location characteristics and integration outcomes (Supplementary Table 27). Overall, while these findings suggest that location is not a major factor in explaining the integration success of private hosting, we cannot entirely rule it out on the basis of the available evidence.

To explore the contact mechanism, we examine whether the effects of being privately hosted intensify with more frequent contact with the host. If the effect of private hosting is driven by contact, we would expect that more frequent contact with the host would result in higher integration success. To test this we leverage a question that asked refugees how frequently they communicated with the host and the answer options were coded on a five-point scale ranging from never (0) to daily (4). Respondents who are not privately hosted are coded zero on the scale. We then replicate the regression models instrumenting the variable that measures the frequency of contact with the indicator for whether refugees were matched to a host by UU. The results, shown in Fig. 4b (also Supplementary Table 22, column 5), show that a higher frequency of contact with the host is associated with larger gains in integration success. While this test does not rule out the possibility that being matched could affect integration via other mechanisms, it does at least provide suggestive evidence for the idea that the contact mechanism explains part of the integration effects of private hosting. Of course, there could be other mechanisms contributing to the effect that we cannot explore with our data at hand.

Discussion

This study examined the short- to medium-term impact of private hosting on the integration of Ukrainian refugees in Germany. By combining registration data from Germany's largest refugee matching platform with an original survey, we compared refugees who were matched with private hosts to those who were not. By controlling for the same characteristics used in the matching process, we estimated the causal effect of private hosting while accounting for selection based on observable factors.

Our findings indicate that private hosting significantly enhances refugee integration across several dimensions, particularly in social, psychological and navigational integration, while showing no discernible effects on linguistic, economic or political integration. These effects were consistent across different models and refugee subgroups and remained stable when compared with refugees in public housing or private rentals. Additional analyses suggest that the positive impact of private hosting is driven by frequent interactions with hosts rather than differences in geographic placement.

These findings provide new insights into theories of immigrant integration. The positive effects on social, psychological and navigational integration—alongside the null effects on linguistic integration—challenge canonical models such as Gordon's assimilation theory and Esser's four-dimensional framework of integration, which suggest that linguistic adaptation is a prerequisite for other forms of integration^{27,28}. Instead, our findings align more closely with Berry's acculturation framework³⁴, social capital theories^{35,36} and affective and relational models of integration^{37–40}, which highlight the role of social relationships and emotional well-being in shaping integration trajectories.

Our results are also consistent with the concept of 'new assimilation' proposed by ref. 41, which recognizes multidirectional and flexible pathways of integration. This framework suggests that

progress in psychological and social dimensions can occur independently of, or even precede, progress in other areas such as linguistic integration.

Additionally, our findings resonate with transnational perspectives on refugee integration, which emphasize the ongoing ties migrants maintain with their country of origin⁴². For Ukrainian refugees, strong emotional and practical connections to their homeland—along with expectations of eventual return—may reduce the incentive to invest in language learning or long-term labour market integration in Germany.

Our findings have important policy implications for host countries managing large-scale refugee arrivals. Private hosting can serve as a cost-effective complement to public asylum reception and housing systems, particularly during mass displacement events that overwhelm public infrastructure. By leveraging civil society engagement, private hosting provides immediate support to refugees and facilitates early-stage integration in key social and psychological dimensions. However, private hosting alone is not sufficient to achieve long-term integration in all dimensions.

If governments seek to harness the benefits of private hosting in future refugee crises, they may need to implement regulatory adjustments that allow for more flexible placement of refugees, by activating existing temporary protection mechanisms, relaxing strict geographic allocation policies or incorporating private hosting into official allocation systems.

While our study provides insights into the effects of private hosting on refugee integration, several limitations should be acknowledged.

First, our analysis focuses on the short- to medium-term effects, with integration outcomes measured approximately 1 year after arrival. The longer-term consequences of private hosting remain unknown.

Second, our study relies primarily on self-reported survey data rather than behavioural or administrative outcome measures. While survey responses provide valuable insights into refugees' perceptions of their integration, they may not always align with behavioural or administrative outcomes.

Third, private hosting may be inherently heterogeneous and our study does not fully disentangle the mechanisms driving integration success. While our findings suggest that frequent interactions with hosts play a crucial role in integration, we cannot fully rule out alternative mechanisms.

Fourth, our findings are based on a specific population—Ukrainian refugees in Germany who registered with UU. While these results provide valuable insights into one important large-scale private hosting programme, they may not fully generalize to other refugee groups.

Fifth, while our quasi-experimental design minimizes selection bias by comparing matched and unmatched applicants, the study is not a fully randomized intervention.

Despite these limitations, our study serves as a starting point for understanding the role of private hosting in refugee integration. It is important to emphasize that our findings should not be interpreted as evidence that private hosting is a panacea for refugee integration. Instead, they highlight its potential as part of a broader toolkit of policy solutions.

Several key questions remain for future research. First, more research is needed to examine how best to regulate and monitor the safety of private hosting for both refugees and hosts, the processes for vetting, training and supporting hosts and which types of refugees would benefit the most from private or public accommodation. Initial data from our survey suggest that refugees' satisfaction with private hosting is consistently high, with only a handful of reports of negative experiences with hosts (Supplementary Information Section 3.6). Proper oversight of hosting programmes is crucial to protect refugees from potential risks associated with being matched with unscrupulous hosts (and vice versa), just as proper oversight is important to ensure the safety of refugees in public asylum centres.

Second, it remains an open question whether private hosting would yield similar benefits for other refugee groups beyond Ukrainian refugees and whether it is suitable for particularly vulnerable groups (such as large families). One potential concern is that the support for hosting Ukrainian refugees was particularly high because they were perceived as fellow Europeans, predominantly white, female, well-educated and Christian^{43,44}. Nevertheless, recent research indicates that attitudinal support for refugees in Europe has remained remarkably stable over the past decade and has even increased despite multiple refugee crises^{45,46}. Consistent with this, ref. 11 found that in their survey of UU hosts, 80% reported that they would host refugees again and, of those, two-thirds said they would also host refugees from other conflict areas.

Third, future research is also needed to gain a more precise understanding of the mechanisms through which private hosting enhances integration and how these effects are moderated by the quality of the host and the match between the refugee and the host.

Lastly, given that interventions early after arrival can often have longer-term consequences for integration success^{18,19}, it will be important for future research to conduct follow-up studies to examine whether private hosting might have longer-term effects on refugee integration. This will be especially important for linguistic, economic or political integration, where effects may take longer to materialize^{47,48}. Future research here should also incorporate administrative data, behavioural measures or experimental interventions to complement self-reported integration outcomes.

Methods

The project and the survey received approval from the ETH Zurich Ethics Commission (EK-2023-N-122), the German Centre for Integration and Migration Research Ethics Commission (DeZIM, EK06/2023) and the Stanford University Institutional Review Board (72870). We obtained informed consent from all our participants through a consent form at the start of our survey (details in Supplementary Information Section 2.1).

Private hosting of refugees

UU was established in Germany around the time of the Russian invasion of Ukraine and connected refugees to local residents who were willing to host refugees. These arrangements were typically temporary and cost-free. Several similar private hosting initiatives operated across European countries during the Ukrainian crisis. Examples include programmes such as 'Homes for Ukraine' in the United Kingdom, 'Register of Pledges' in Ireland, 'Who Will Help Ukraine' in Slovakia, 'Familia Necesita Familia' in Spain and 'Our Choice' in Poland⁸.

It is worth emphasizing that while hosting arrangements varied across contexts, private hosting as facilitated by matching platforms was typically a fairly informal arrangement where locals offered their homes on short notice to refugees without prior connections and without assuming formal responsibilities for their integration. This is in contrast to private refugee sponsorship and/or co-sponsorship^{14–17}, a longstanding model used in Canada and some other countries. In this model, individuals or groups formally commit to resettling a refugee family, providing comprehensive settlement support such as financial aid, housing assistance and job placement. Sponsors apply with the government, undergo training, adhere to specific requirements and regulations and have to commit to providing long-term support (for example, up to 2 years in Canada). In addition private sponsorship often involves a naming system, where sponsors select specific refugee families abroad, often other family members or relatives. Thus, the private hosting we examine in our study differs in scope, duration, engagement and oversight from these alternative models.

Setting

Our study relies on registration data from the non-profit matching platform UU. The registration process for hosts and refugees on the

platform involved providing essential information. Hosts registered by sharing details such as the location of their accommodation, the type of accommodation (for example, shared room and shared house), the number of available beds, the presence of other family members at the accommodation, languages spoken and the periods during which the accommodation was available.

Refugees registered by providing key information, including their name, gender, date of birth, family size, the total number of beds required, languages spoken, intended date and place of arrival in Germany and their preferred municipality of residence. UU then used these data to match hosts with refugees and facilitated the connection between the two parties to arrange for the refugee to move into the provided accommodation.

One aspect of the policy environment that facilitated the matching was that the European Union activated the Temporary Protection Directive for all Ukrainian refugees. This meant that Ukrainian refugees could be matched to hosts in any geographic area in Germany, since they were not subject to the geographic allocation quota system that typically governs how asylum seekers are distributed after arrival in Germany.

Despite recruiting a sizable number of hosts, demand for accommodation often surpassed the available number of hosts, resulting in only 19% of registered refugees ultimately being matched with a host. Further information about the matching process and registration forms can be found in Supplementary Information Section 1.

Identification strategy

To establish the effect of being privately hosted on refugee integration, we leverage the comprehensive registration data used by UU to facilitate the matching of hosts and refugees. This unique dataset enables us to identify the impact of private hosting under a credible selection-on-observables assumption³⁰ by comparing refugees who were successfully matched with a host by UU with observably similar refugees who registered with UU but were not matched with a host because of host unavailability at the time. Since the matching process performed by UU was based on the same refugee characteristics that we observe in the registration data, controlling for these covariates mitigates the risk that the integration potential and other unobserved characteristics of refugees who were matched do systematically differ from those who were not matched, thereby removing selection bias in the comparison (details in Supplementary Information Section 2.6).

To estimate the effects, we conduct regression analyses using the standard framework for selection-on-observables designs with non-compliance^{30,49} and apply two-tailed hypothesis tests. There are two central estimands of interest for our study: ITT and LATE. This distinction follows the established methodological literature on estimating causal effects of policy interventions^{30,49}.

First, we estimate the ITT effect, which measures the effect of being matched to a private host by UU versus not being matched. This captures the difference in average integration outcomes between refugees who were matched to a private host by UU and observably similar refugees who registered with UU but were not matched. To estimate the ITT, we regress integration outcomes on a binary indicator that specifies whether the refugee was successfully matched or not. A comprehensive set of registration characteristics used for matching is included as control variables (details in Supplementary Information Section 2.7). The coefficient associated with the matching indicator in this regression identifies the ITT effect of being matched with a private host.

Second, we estimate the LATE, which measures the effect of actually moving in with a matched private host versus not doing so. Owing to non-compliance, not all refugees matched by UU ultimately moved in with their matched host. To address this, we apply the standard LATE framework using two-stage least-squares instrumental variable regression⁴⁹. Here we define a binary treatment variable indicating whether refugees moved in with their matched private host and instrument

this treatment variable with the indicator of whether refugees were matched by UU. We control for the same comprehensive set of registration characteristics as before. The coefficient associated with the treatment variable in the two-stage least-squares regression identifies the LATE, which measures the difference in average integration outcomes for refugees who, because they were matched by UU, moved in with their private host compared with those who were not matched and thus did not move in.

The LATE applies specifically to the subgroup of compliers—refugees whose decision to move in with a private host is determined by whether they were matched by UU. In other words, compliers are those refugees who would move in with a private host if matched by UU, but would not do so if not matched. Importantly, compliers differ from two other groups: always-takers, who would move in regardless of being matched and never-takers, who would not move in even if matched. For compliers, the decision to move in can be considered as good as randomly assigned, given the quasi-random nature of the matching process and the identification assumptions. Note that the two-stage least-squares regression estimates LATE specifically for this subgroup, even though the model is applied to the full sample of refugees in the survey (see ref. 49).

The choice between ITT and LATE depends on the perspective and the goals of the analysis. From a policy perspective, ITT is often more relevant, as it evaluates the effect of offering a match to a private host. This reflects the practical reality that one can only offer matches to refugees but cannot enforce whether they actually move in with their matched hosts. The ITT provides a measure of the average impact of the matching intervention as implemented, accounting for real-world non-compliance.

From a theoretical perspective, LATE is particularly valuable when the goal is to understand the causal effect of moving in with a private host *per se*. By isolating the effect on compliers, LATE provides insights into the mechanisms of integration driven specifically by private hosting. This makes it a useful tool for examining the potential of private hosting as an integration strategy under idealized conditions where compliance is guaranteed.

Thus, ITT and LATE are complementary estimands that serve distinct purposes: ITT captures the overall effect of the matching intervention, while LATE isolates the specific causal effect of private hosting among compliers, providing deeper theoretical insights into its integration dynamics.

To validate our identification strategy, we conducted a series of placebo balance checks using a set of additional predetermined refugee characteristics that we measured in our survey, but were not captured in the registration data that UU used to conduct their matching. These additional refugee characteristics included citizenship, education, income in Ukraine, self-identification as LGBTQ+, employment in Ukraine, region of origin in Ukraine and relationship status. We regressed these refugee characteristics on the indicator for whether refugees were matched or not, controlling for the set of registration characteristics that were used for matching. We find that, conditional on characteristics that were used by UU for the matching, being matched is unrelated to the additional refugee characteristics that were not observed by UU. Across 22 balance checks, only one covariate had a statistically significant imbalance, but it was substantively small. This corroborates our selection-on-observables assumption and suggests that matched and unmatched refugees are unlikely to differ on unobserved confounders (Supplementary Information Section 2.11).

Note that for the main impact analyses described above, we evaluate the effects of being matched to a private host by comparing refugees who were matched by UU with those who were not. Therefore, this analysis quantifies the overall impact of being matched to a private host versus all alternative housing arrangements pursued by refugees who were not matched. This control condition includes refugees who ended up being housed in public asylum centres as well as those who

rented private accommodations on their own (without a host). While understanding the overall impact of private hosting against all other relevant alternatives is of key policy interest, we also later conduct subsequent analyses examining how private hosting compares specifically to the two main alternatives: living in public refugee housing or renting a private accommodation without a host.

Sample

Our analysis sample is derived from a survey of refugees conducted using the registration data of UU as the sampling frame. On 1 June 2023, we extended online survey invitations to all refugees who had registered with UU, provided valid contact information and were within the legal purview of UU to contact (Supplementary Information Section 2). The survey questionnaire focused on refugees' integration progress and their housing arrangements subsequent to their arrival in Germany.

To enhance the response rate, we offered to donate €5 to a refugee charity working for each completed survey. Respondents had the option to select a charity from a list of six different options. In total, 2,811 refugees participated and 1,870 answered all survey questions. The main estimation sample includes everyone who participated in the survey, arrived in Germany in or after January 2022 and remained in Germany up until the survey day ($n = 1,700$). Because of item non-response, effective sample sizes vary slightly across regression models. A non-response analysis revealed that the characteristics of the responding sample closely resembled those of non-responders across the covariates recorded in the registration data (as detailed in Supplementary Information Section 2.4). However, refugees who had been matched to private hosts by UU were 8.5 percentage points more likely to respond to the survey compared with refugees who had not been matched. To address potential non-response bias, we use entropy balancing weights⁵⁰ to adjust the composition of responders to align with the overall population across all covariates. The effect estimates obtained with and without the application of these weights remained similar (Supplementary Table 11). Within the estimation sample, 61% of the respondents were female, 17% male, about 1% non-binary and 21% did not disclose their gender or left the survey before being asked about their gender. The average age of the estimation sample was 36 years.

Because our outcome of interest, refugee integration success, refers to integration in the host country Germany, we remove from the analyses respondents who were not living in Germany at the time of the survey. Note that, as shown in Supplementary Information Section 2.9, being matched to a host by UU has no effect on the probability of living outside of Germany at the time of the survey and therefore this sample restriction is unlikely to introduce bias into our estimates of the effects of private hosting on integration outcomes.

In terms of timing, the first refugees in our survey estimation sample arrived in Germany in February 2022, around the start of the full-scale Russian invasion of Ukraine. The median month of arrival was April 2022, with the 25th percentile in March 2022 and the 75th percentile in July 2022. Given that our survey was conducted in June 2023, this indicates that, for most respondents, our survey measures integration outcomes approximately 1 year after their arrival in Germany. The median residency duration in Germany at the time of the survey was 14 months, with the 25th percentile at 11 months and the 75th percentile at 15 months. We therefore consider our effect estimates to be short- to medium-term effects. For detailed information on the timeline of relevant events, see Supplementary Information Section 2.5.

Note that refugees in our estimation sample usually registered with UU shortly after arrival in Germany (within 2 month or less, the median was 1 month after arrival). Among those who were successfully matched with a host, the matching usually occurred within the same month that they registered and they moved in with the host within 1 month of being matched.

Lastly, to assess the generalizability of our sample, we conducted a comparison of the demographic distribution of our respondents with data from a representative survey and population-level statistics of Ukrainian refugees in Germany, as documented in ref. 51. Our analysis indicates that our sample closely mirrors the overall population of Ukrainian refugees in Germany across various characteristics, including gender, state of residence in Germany, age, education, employment, marital status, parenthood and region of origin in Ukraine. While our sample exhibits a slightly younger age distribution and a somewhat higher proportion residing in urban areas, these differences are modest (Supplementary Information Section 2.10).

Outcomes

To measure the integration success of refugees we use the survey-based, multidimensional integration index IPL-12 (ref. 29). This measure defines successful integration as the acquisition of knowledge and capabilities necessary to establish a fulfilling and prosperous life within the host society. This integration metric, used by several studies conducted in different contexts (for example, refs. 52–55) and adopted by the International Organization of Migration⁵⁶, gauges integration success through two questions for each of the six dimensions: psychological, economic, political, social, linguistic and navigational integration. For example, navigational integration evaluates the challenges immigrants face when searching for employment or accessing medical care in the host country. Further details about each dimension and their measurements are available in Supplementary Information Section 2.2.3.

We investigate several outcome variables, including the overall IPL-12 index that amalgamates all six dimensions, as well as subindexes for each of the six dimensions individually. These outcomes are evaluated on a scale ranging from 0 to 1, with higher values indicating greater levels of integration success.

One specific concern pertains to the social integration dimension, which is defined as 'capturing social ties and interactions with natives in the host country'²⁹. Given that private hosting involves connecting refugees with native hosts, there might be apprehension about the possibility of observed effects being merely mechanical. However, this concern is alleviated for at least two reasons. First, our survey measuring social integration was conducted several months after most refugees had already moved out, thereby capturing the sustainability of social integration beyond the period when refugees resided with their hosts. In addition, conceptually, the bond between refugees and their hosts should not be considered less important than contact with other Germans. If matched refugees are more likely to respond that they have, for example, dinner with Germans at the time of the survey compared with the control group, then this does suggest that they are better integrated socially even if they were referring to a recent dinner with their former host. Second, studies have presented mixed and sometimes conflicting results about the impacts of social contact between different identity groups on between-group discriminatory behaviours, attitudes and conflict^{13,57}. In fact, several studies suggest that mere exposure instead of social contact can lead to heightened intergroup tension and a desire for reduced future interactions^{58,59}. Hence, it remains theoretically ambiguous whether connecting refugees with hosts would augment or diminish future social interactions with natives.

To further mitigate this potential concern, we also use an overall IPL-12 index that excludes the social integration dimension and focuses solely on the other five dimensions. This analysis aims to ascertain whether the effect of private hosting extends beyond the social integration dimension.

Reporting summary

Further information on research design is available in the Nature Portfolio Reporting Summary linked to this article.

Data availability

To protect survey respondents' privacy, the survey data merged with the registration data and additional location variables used for the analysis are only available via controlled remote access. To access the data, interested researchers must create an account with the DeZIM research data centre at <https://fdz.dezim-institut.de/en>. Once registered, they can apply for access to the dataset via the request form on the DeZIM research data centre website. To apply for data access, researchers must give information on their institutional affiliation, the title of their research project, the expected duration of their research project, the goal of their research project and the methods to be applied to the data. They must then accept the terms of use and, after the application is approved, must sign a data use agreement, which must be physically sent to the DeZIM institute. Afterwards, interested researchers are able to remotely access the data.

Code availability

All analysis code is available in the Harvard Dataverse⁶⁰.

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Acknowledgements

We express our gratitude to D. Pysmennyi for data access and research support, R. Rischke for facilitating contact with UU, L. Kokonowskyj and O. Smetanina for reviewing the translation of the questionnaire and P. Grech, S. Kurer, A. Lichtenheld, M. Peinl and S. Wehrli for their administrative and technical support. We also thank the participants of the EGAP Displacement, Migration and Integration Priority Theme Meeting (NYU-DC, 9–10 February 2024) for valuable feedback. Funding for the survey and research assistance was provided by the German Federal Ministry of Family Affairs, Senior Citizens, Women and Youth and the European Research Council under the European Union's Horizon 2020 research and innovation programme (grant no. 804307). Funding bodies had no role in the design, data collection, analysis, preparation of the study and decision to publish.

Author contributions

N.H., D.H., M.H., M.M. and J.H. designed research. M.H., A.O., D.H. and N.H. collected data. M.M., M.H. and A.O. analysed data. J.H. wrote the paper with edits from M.M., M.H., A.O. N.H. and D.H.; M.M., M.H. and N.H. wrote the Supplementary Information with edits from D.H., J.H. and A.O.

Competing interests

The authors declare no competing interests.

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1038/s41562-025-02303-5>.

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Peer review information *Nature Human Behaviour* thanks Dany Bahar and the other, anonymous, reviewer(s) for their contribution to the peer review of this work.

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We have made the analysis code available via the Harvard Dataverse. To protect survey respondents' privacy, the survey data merged with registration data and the location data is made available via controlled remote access as described in the data availability section of the manuscript.

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Reporting on sex and gender

We measure gender in the survey. For all survey languages that differentiate between biological sex and social gender (Ukrainian, Russian, English) we used the appropriate term in translation. Participants could choose between three gender categories (male, female, non-binary) or decide not to respond to the question. We report the distribution for the gender covariate in SM Table 5 and we report a gender-specific effect for our main analysis in Figure 3 (Panel A).

Reporting on race, ethnicity, or other socially relevant groupings

We did not ask respondents to report their race or ethnicity as social categories in our survey. We do ask if respondents identify as LGBTQ+ using the following survey question: Do you think of yourself as lesbian, gay, bisexual, asexual, transgender, non-binary, intersex, agender or in any other way queer? Respondents are given the option to say Yes, No or decide not to respond to the question. We report the distribution for this covariate in SM Table 5.

Population characteristics

See below.

Recruitment

Participants self-select to answer the survey to which we invite them (see below). We conduct a non-response analysis demonstrating that respondents and non-respondents are similar on observable characteristics and we adjust for observable differences in our analysis using entropy balancing.

Ethics oversight

The survey and the project received IRB approval from ETH Zurich (EK-2023-N-122), the German Center for Integration and Migration Research (DeZIM, EK06/2023), and Stanford University (72870).

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☒ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description

We conducted an online survey to collect quantitative data and we analyzed this data mainly using statistics.

Research sample

All refugees that registered with the non-profit organization #UnterkunftUkraine (UU) and that were legally contactable on June 1, 2023 when the survey invitation was send out.

Sampling strategy

No sampling. We invited everyone that registered on the platform and that were legally contactable (N=41,237).

Data collection

The survey data was collected using a self-administered online survey. We used Qualtrics to program the online survey.

Timing

The survey invitation email was send out on June 1st, 2023. The data collection ended on July 27th 2023.

Data exclusions

The survey questionnaire was tested in two pilots in May 2022 (N=53). The data from these pilots are not included in the analysis as we made changes to the survey questionnaire (e.g., more precise wording of survey questions).

Non-participation

2,905 individuals participated in the survey. We define participation as someone who consented to the terms of the survey. We screen out 94 respondents who were ineligible to participate because they were younger than 16 years old. This leaves as a total of 2,811 complete and partial responses. 1,870 respondents answered all questions. Assuming that the proportion of ineligible non-respondents is the same as in the proportion of ineligible respondents (94/2905), the cumulative response rate as defined by the American Association for Public Opinion Research is 6.1% (RR2) and 3.9% (RR3).

Randomization

No randomization

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involvement in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involvement in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Plants

Seed stocks	n/a
Novel plant genotypes	n/a
Authentication	n/a