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Refugee journey infrastructures: Exploring migration trajectories from South Sudan to Uganda

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Abstract

This article investigates the nature of refugee journeys by triangulating open-ended, closed, and spatial survey data collected among South Sudanese refugees in Northern Uganda. While much research focuses on migration pathways across borders into the Global North, knowledge about refugees' journeys within their countries of origin or to neighbouring countries is limited. By targeting refugees' initial journeys out of conflict settings, we shed light on this little-studied aspect of the refugee experience, with the aim to contribute to a better understanding of refugees' choices en route. We scrutinise the geographies and dynamics of refugee journeys, including the impact of conflict and violence, travel companions, information sources, assistance, and modes of transportation. We further analyse the links between these experiences and the complexity, length, and duration of refugees' journeys, aiming to map the varying significance of what refugees face during their journeys. Drawing on the migration infrastructure literature, we adapt and apply these concepts to refugee journeys, enhancing our understanding of refugees' initial journeys within and out of conflict settings, conceptualised as refugee journey infrastructures.

KEYWORDS
conflict, GIS, infrastructure, journey, migration, refugee, South Sudan, Uganda

1 | INTRODUCTION

What do refugees' initial journeys within and out of conflict settings look like, and what shapes them? To improve our understanding of the nature of refugee journeys, we draw on a unique triangulation of open-ended, closed, and geographic data from a survey conducted with South Sudanese refugees in two settlements in Northern Uganda (2022) (*n* = 1008). Much scholarly attention has been paid to migration trajectories across increasingly fortified and deadly international borders into the Global North, and the navigation that migrants and those facilitating their journeys undertake (see e.g.,

McMahon & Sigona, 2021; Sladkova, 2016). Far less is known about how refugees travel within their own countries, to reach safety there, or by crossing into neighbouring countries (see e.g., Fiddian-Qasmiyeh, 2020). Taking the case of South Sudanese refugees, one of the fastest-growing refugee populations globally, we seek to complement existing studies on migration journeys with a detailed analysis of the infrastructures shaping refugee journeys within South Sudan and into Uganda.

Conflict-related mobility is often characterised as flight or displacement, with questions posed about the degree of choice for those involved (Erdal & Oeppen, 2018). While many people in

conflict-affected areas stay put or move short distances, hoping for a swift return, research shows that displacement frequently becomes protracted (Kraler et al., 2021). The international community focus on managing and resolving protracted displacement situations, ideally through peace and repatriation, or, alternatively, through local integration or resettlement, including formal and informal solutions. Simultaneously, efforts are being made to refine our understanding of refugees in protracted displacement situations by emphasising their agency, resilience, and networks (Etzold & Fechter, 2022; Tobin et al., 2022).

Refugee journeys within the Global South receive limited scholarly attention compared to conflict dynamics and refugees' life post-displacement. In this paper, we focus on refugees' initial journeys, to shed light on an aspect of the refugee experience which is little studied, and to enhance our understanding of what shapes refugees' options and vulnerabilities en route. The paper delves into the dynamics of refugee journeys, scrutinising refugees' routes and choices, who they travel with, where information comes from, how conflict affects them on their way, whether and how help is sought or gained, and how they actually travel. We also scrutinise how these dynamics affect the complexity, length and duration of their overall journeys. Given the diverse ethnic composition of South Sudan, we also examine how ethnicity, particularly Nuer versus non-Nuer, shapes these journey characteristics and experiences, acknowledging the salience of ethnicity in the conflict.

By addressing the question of what refugee journeys look like, and what shapes them, we propose and develop the notion of 'refugee journey infrastructures'. We consider refugees, and other migrants, as people on the move, whose labelling and self-identification may change over time. While labels depend on the perspectives taken, all share some experiences of agency and choice, as well as of constraint and limitations. Thus, we advocate an analytically holistic view of people on the move—and the need for a more robust understanding of their journeys.

2 | UNDERSTANDING JOURNEYS

Growing scholarly attention to migrant journeys highlights the need to go beyond an 'origin' and 'destination' focus (Amrith, 2021; Crawley & Jones, 2021). This may also be seen as a response to shifting migration realities, resulting from policies leading to increasingly deadly borders to Europe and the United States (McMahon & Sigona, 2021). Thus, much research on migrant journeys has focused on 'transit' and 'irregular' migrant trajectories to Europe (Collyer, 2007; Kuschminder & Waidler, 2020) revealing the continuity of people's agency throughout evolving journeys.

Previous research on migration journeys emphasises the structures surrounding the migratory process, with a focus on such as 'migration industries' (Gammeltoft–Hansen & Nyberg Sørensen, 2013), policy changes and shifting routes (de Haas et al., 2019), the role of networks (D'Angelo, 2021) and the use of communications technologies while travelling (Schapendonk & van Moppes, 2007). These findings are context specific, and not always aimed at understanding how and why migrants travel in a specific manner. Previous research on refugee journeys, more specifically, has tended to focus on destination choices, secondary movements, resettlement and repatriation patterns (Black & Robinson, 1993; Havinga & Böcker, 1999).

Our analysis highlights the interrelated aspects of agency and structure, essential for understanding migrant journeys and related experiences. Zooming in on the specific case of South Sudanese refugees who have travelled out of conflict-affected areas to Uganda, in combination with scholarship on 'migration infrastructure' (Lin et al., 2017; Lindquist et al., 2012; Xiang & Lindquist, 2014), we propose a conceptualisation of refugee journey infrastructures. This framework includes insights on the roles of conflict, violence, and agency, relating to experiences and choices during journeys within and out of conflict settings.

Migration journeys are influenced by roads, transportation modes, information provision, and technologies. To better understand such factors as they appear in and shape refugee journeys, we draw on the concept 'migration infrastructure', which refers to 'the systematically interlinked technologies, institutions, and actors that facilitate and condition mobility' (Xiang & Lindquist, 2014). For analytical purposes, infrastructures have been categorised along five dimensions that, alone or in combination, mediate migration processes; commercial, regulatory, technological, humanitarian, and social aspects. It also includes 'human and nonhuman' actors and factors as part of the migration infrastructure, as 'these physical and organisational architectures are generative of migrant mobilities' (Lin et al., 2017).

Comparing 'infrastructures of superdiversity' (Blommaert, 2014 and Maly, 2016) with 'arrival infrastructures' (Wessendorf, 2022) reveals a distinction in relation to the potential role of migration infrastructures. The first conceptualises infrastructures as *created by the population* to 'meet its needs' and to 'create structure' in their complex situations (Maly, 2016); the second, building on Xiang and Lindquist (2014), sees infrastructures as 'concentrations of institutions, organisations, social spaces, and actors that specifically facilitate [migration]' (Wessendorf, 2022). This distinction underscores whether *a specific population shapes infrastructures*, in contrast to how *infrastructures affect the population*. For our analysis of refugee journeys, we therefore approach infrastructures as dynamic, acknowledging that infrastructures produce and shape journeys *and* that refugees themselves may influence, or produce, the infrastructures their journeys depend on.

Existing literature on 'migration infrastructures' emphasises specific subsets of migration, such as Asian labour migration, and refugees and other migrants travelling to(ward) Europe or the United States. African migration processes have hardly been linked to the idea of infrastructures (for notable exemptions see Kleist & Bjarnesen, 2023; Landau, 2021), nor have migration journeys in or out of conflict settings. While there are many similarities between migration journeys across settings, certain issues are more likely to affect journeys in conflict-affected contexts, such as questions of human security and the impacts of violence. To contribute to the literature on journeys by focusing on a specific conflict setting in

Africa, a focus on decision-making, agency, risk-assessment and experiences of violence are central. On this basis, our analysis is of the initial journey through conflict-affected contexts, and the infrastructures that shape, it in South Sudan, and not of what happens before (e.g., the decision to leave), or after (e.g., conditions in places where safety is sought).

2.1 | South Sudanese refugees in Uganda

The conflict in South Sudan is rooted in a complex interplay of ethnic, political, and economic factors (Chanie, 2021). Following independence from Sudan in 2011, South Sudan was embroiled in a devastating civil war that began in 2013, sparked by political power struggles between President Salva Kiir, an ethnic Dinka, and his former deputy, Riek Machar, an ethnic Nuer. The conflict caused widespread violence, human rights abuses, and a large-scale humanitarian crisis, with numerous ceasefire agreements proving to be short-lived (UN, 2023; Young, 2019). Because of the conflict, South Sudan has witnessed an increase in the number of internally displaced persons (IDPs) and refugees fleeing the country. As of February 2023, there were an estimated 2.2 million IDPs and 2.3 million South Sudanese refugees, making it one of the largest displacement crises in Africa (UNHCR, 2023).

The conditions in South Sudan that have spurred forced migration are characterised by pervasive insecurity, economic instability, and severe human rights violations. Ethnic tensions often escalate into violent confrontations and civilians are also frequently targeted, leading to loss of life, destruction of property, and widespread fear (Kindersley & Rolandsen, 2019). The overall economic situation is dire, with drought and floods threatening the livelihoods of many, on top of inflation, food insecurity, and the lack of basic public services (Worldbank, 2024). These factors collectively drive large numbers of South Sudanese to seek refuge in neighbouring countries. The ethnic dimension of the conflict has profound implications on these migration patterns and the experiences of South Sudanese refugees and, as we show, particularly between Nuer and non-Nuer groups.

Being a neighbouring country, Uganda is a primary destination for South Sudanese refugees, furthered by its inclusive policy for refugees (Zhou et al., 2023). Upon arrival, refugees are typically registered by the Ugandan government and the UNHCR, before being allocated to refugee settlements. Uganda's refugee policy aims to integrate refugees into local communities, granting access to land, education, healthcare, and employment opportunities (UNHCR, 2022). Consequently, Uganda hosts diverse refugee settlements, including organised settlements such as Rhino Camp, and urban areas such as in Kampala, where refugees live alongside locals (Bohnet & Schmitz-Pranghe, 2019).

Research about South Sudanese refugees in Uganda has explored their vulnerability, but also their well-being, resilience, and security concerns (see e.g., Kaiser, 2013; Schiltz et al., 2019). Research on mobility patterns traces their cross-border movements between northern Uganda and South Sudan (Leopold, 2009).

Particular attention is given to continual mobility (Huser et al., 2019; O'Byrne & Ogeno, 2020), and repatriation efforts (Hovil, 2010; Komakech & Garimoi Orach, 2022), sustaining throughout periods of conflict. Recent studies find return journeys to be 'pragmatic mobilities' in response to 'trying times and unknowable circumstances' (O'Byrne & Ogeno, 2020), and the presence of 'yo-yo' mobility back and forth the border (Huser et al., 2019), for example, to gain information about security and property.

Mobility forms an essential part of many South Sudanese people's lives in Uganda. It can be empowering (Vancluysen, 2022) and provide refugees with the ability to cope with complex situations (Serra Mingot & Mazzucato, 2019). Although—as Sturridge (2011) also find in the case of Afghan and Somali refugees—individuals' mobility strategies are likely to vary depending on structural factors and individual agency (Vancluysen, 2022). Less research to date has been concerned with the factors that affect refugees' mobility, experiences and choices en route, during their initial journeys within South Sudan and to Uganda, which is a gap this paper seeks to address. Understanding the relationship between the reasons for flight and the subsequent journeys is crucial for insight into the dynamics of refugee movements. The conditions in South Sudan, characterised by a combination of immediate threats to safety, long-term economic and conflict-related instability, and the breakdown of social structures, influence not only the decision to flee but also the strategies adopted by refugees on their journeys within South Sudan, towards Uganda.

3 | RESEARCH DESIGN

This paper draws on data from an original face-to-face survey of South Sudanese refugees in Rhino Camp Refugee Settlement, Northern Uganda (April–May 2022). Conducting research with refugees about their conflict experiences, decisions to leave, travel modes out of conflict-affected home areas, requires careful ethical consideration.[1] This research was therefore planned and prepared carefully, with the execution, piloting and fine-tuning done in collaboration with an experienced Ugandan research partner. We worked with competent South Sudanese research assistants, acting as enumerators in the field, and later translators and transcribers for the open-ended questions, including individuals who themselves lived or had lived in the refugee settlements. Subsequently, follow-up meetings were held in Uganda (2024) to discuss preliminary insights with local stakeholders, leaders within the refugee settlements, and migration-related NGOs. These discussions allowed us to verify and enrich our findings, providing additional contextual insights.

The survey was conducted using tablets for enumeration, adopting a unique mixed-methods approach, including structured

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[1]The survey data collection in its entirety followed research ethical requirements in Norway, where the funding was and authors institutions are located, as well as getting ethics clearance in Uganda, with Makerere University, and the required permit from the Prime Minister's Office in Uganda, to conduct research in refugee settlements.

survey questions, audio-recorded open-ended questions, and an innovative mapping exercise where respondents were asked to draw their journeys from and within South Sudan to their current location using Participatory Geographic Information Systems (PGIS). During this interactive process, respondents would trace their migratory path, indicating each 'stop' along the way. These stops are referred to as 'nodes' in the geoline representing the drawn journey, allowing us to capture the complexity of their migration route. Geographic Information Systems (GIS) software was utilised to calculate the route length and the number of nodes, transforming the hand-drawn data into quantifiable metrics.

The survey respondents (n = 1008) constitute a random sample from two settlement zones in Rhino Camp Refugee Settlement, Uganda: zone Tika, 405 respondents, and zone Omugo, 603 respondents. Sampling involved a full listing, followed by random household sampling. Data collection, including testing and refining the survey instrument, was done collaboratively with the Ugandan research partner and assistants. Enumerator training was conducted jointly, in Kampala with online participation of two of the authors. The survey was conducted in Nuer, Dinka, Juba or South Sudanese Arabic, Bari, Madi, and English, depending on the ethnolinguistic group of the respondent.

The survey questions covered life before fleeing to Uganda, decision-making about leaving, the journey and experiences along the way from South Sudan to Uganda, and future plans. The mapping component was placed in the middle of the survey with both structured and open-ended questions before and after. This enabled respondents to elaborate on their motivations, decision-making, and trajectories, probing memories as they showed their routes on the map. Their responses were translated, transcribed, and coded using NVivo. In our analysis, we go back and forth between the open-ended responses and the quantitative data, letting both analyses inform one another.

In the quantitative analysis, we first describe frequencies in survey responses before estimating OLS regression models. We examine factors impacting the likelihood that the respondent had to change their route, as well as the driving factors of journey length, duration and complexity. To account for potential confounding variables we include a comprehensive list of control variables, expecting that the refugees' demographic traits such as age, gender, education and family size, influence their journeys. Here, we refer to the likelihood that people with different demographic characteristics may have different levels of knowledge, resources, and risk perception, which will affect the resources available to them and their choices during the journey.

To account for education level, we include a dummy variable for whether the respondent had completed primary school or not. To account for family size, we include a variable of the number of children the household cares for and how many sleeping rooms their premigration house had. We control for whether the household owned a radio or not, before migrating, to capture economic conditions and access to information. We also account for whether the respondent travelled by foot parts of or the whole way, and whether

the respondent received help from anyone during their journey.[2] We include a control variable capturing the distance from origin location to Rhino Camp settlement, whether the respondent received help to move, and a dummy variable indicating whether the respondent planned their route before leaving their origin location. Finally, to account for time-invariant state-level factors, we include dummy variables for each South-Sudanese state. This helps us account for potential unobserved time-invariant factors, mitigating the risk of omitted variable bias, and focus on comparing within-state variation of respondents' journey characteristics. Using state-level fixed effects should provide a more robust estimate.

Given South Sudan's historical and social context, distinct ethnic groups might have different migration journeys, experiences, and outcomes. To account for these differences, we include a variable capturing whether the respondent ethnolinguistically self-reports speaking Nuer or not (all other groups). We do this as the Nuer have historically had unique challenges and dynamics in the context of the South Sudanese civil wars (Calissendorff et al., 2019). Including a variable indicating whether the respondent is Nuer or not allows us to investigate if and how the impact of experiencing violence on journey characteristics differs between Nuer and non-Nuer respondents. We also introduce an interaction term between ethnicity and violence experience to capture differential effects. Including ethnicity and its interaction with violence experiences helps us provide a more comprehensive understanding of the factors shaping refugee journeys.

Since our data is retrospective, a temporal bias must be mentioned, involving risk of recall bias and selective memory, as well as in this case, trauma-related considerations and risks. As we refer to above, care was taken in terms of research ethical considerations, enumerators were part of local communities, and familiar with relevant languages and experiences. Responding to questions about the past—details and insecurities along the way may have been forgotten or distorted because these journeys happened weeks, months or even years ago.[3] In the responses to the open questions, trajectories may be retold following a linear logic, while journeys may have been more fragmented or complex in reality. We recognise these limitations, inherent to retrospective data.

4 | ANALYSING REFUGEE JOURNEYS

Drawing on structured survey data, maps of routes and open-ended questions, the ensuing analysis scrutinises the geographies and characteristics of refugee journeys, their infrastructures, and the impact of conflict exposure en route. The analysis is structured in three sections. First, we map refugee routes using geospatial data and

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[2]We asked respondents '112. Did you receive help to migrate from any of the following? (tick box selection, multiple response possible)'. Response alternatives included A state actor (i.e. government office, local administrative office), Military, An NGO, UNCHR or IOM, Traditional leaders, Family, Friends. We code this variable 1 if the respondent received help from at least one actor in this list.

[3]Median arrival to settlement was 1 June 2018 with standard deviation of ±698 days.

complement this with descriptive data on the infrastructures that characterised the journeys. The insights from this analysis lead us to further explorations of key journey infrastructures, and how these shape refugee experiences and choices en route. Drawing on this, the second part of our analysis offers unique insights into experiences of violence and conflict during the journeys. In the third and final section, we employ a regression model framework to explore the characteristics of the journeys, and analyse the drivers of journey length, duration and complexity.

5 | ROUTES AND INFRASTRUCTURES

To gain insights into the geographical patterns of refugee journeys, we utilised participatory mapping to collect data on the trajectory of each respondent. Doing so revealed a striking heterogeneity in patterns, encompassing diverse spatial trajectories but also a range of experiences and decisions throughout the journey. Although all the refugees in our sample ended up in Rhino Camp, their journeys originate and span most of South Sudan's territory (Figure 1). The mapping also revealed central locations, or nodes, in the geography of these refugee routes.

As the map shows, the refugees travelled from various places of origin, and many journeys went via central locations, such as Juba (in Central Equatoria), continued to a border crossing, before directly

FIGURE 1 Origins and key locations in refugee journeys from South Sudan to Rhino Camp.

travelling to Rhino Camp. Open-ended responses reveal that for the last stretch, most were picked up by the UN at the border and driven directly to the settlement. Overall, we find a high level of variety in journey length, complexity, and possibly also duration. To understand why, the third part of the analysis further explore journey characteristics and analyse the drivers behind them. Yet, first, to improve our overall understanding of these routes and scope out the potential infrastructures shaping them, we connect our geographic insights with an exploration of the descriptive data.

5.1 | Safety information and navigation

When looking at the question of whether the refugees had planned their journey before departure (see Appendix: Figure A1), 372 of the 1008 respondents indicated that they had pre-planned their journey, while 611 had not. When asked, 226 said they had to change their route, while 712 said they did not. Interestingly, of those that changed their route, 70% stated that they had not planned their journey in advance. When asked about the main reasons for the route changes, refugees indicated violent conflict (134), new information (62), access to food (62), transportation availability (52), journey distance (45), health issues (41), seeking assistance (22), and lack of funds/resources (6).

As violent conflict appears to be a key factor affecting route changes, we further investigate the role of violence and conflict in the second part of the analysis. Yet, noting that new information was another factor mentioned, we look at responses to how people got informed about safety. Here, 551 respondents said they consulted people encountered on the way, 424 obtained information from fellow migrants, while only 71 respondents received information from the United Nations High Commissioner for Refugees (UNHCR). In terms of help, beyond information, just over half (634) reported that they did not receive help, 206 received help from family or friends, while 207 received help from the UNHCR or IOM (International Organization for Migration).

Looking at the question of how people navigated during their journeys complements this. Overall, 537 stated that they relied on verbal directions, and 513 stated they were led by someone else. This can be contrasted to the reliance on maps: Of the 937 valid responses to this question, only 121 had used a map at some point during their journey, 75 utilised maps before departure, while 787 never relied on a map for navigation.

Taken together, the responses concerning refugee routes signal that violent conflict, information about safety, and interpersonal verbal directions are important elements shaping the journeys. While this may reveal insights about the infrastructures affecting route changes and choices en route, it does not reveal much about other critical aspects of the journeys. To understand who refugees travel with and which means of transportation they use, we combine our quantitative and qualitative data to understand how this may figure as part of the overall journey infrastructures.
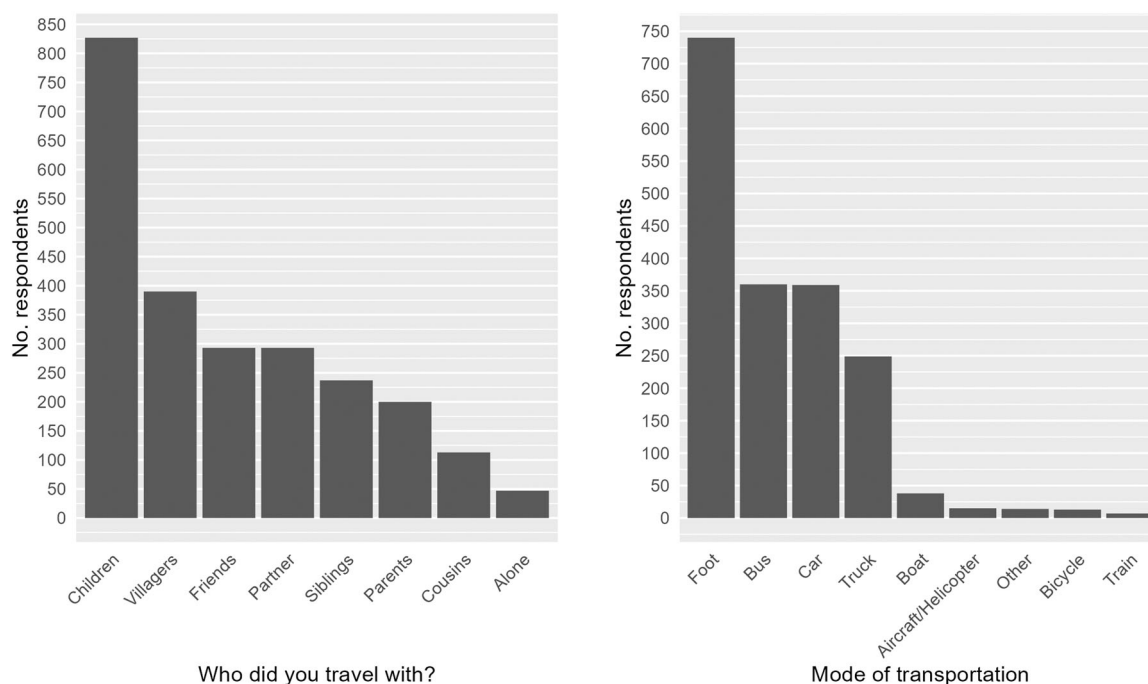
FIGURE 2   Travel companions and modes of transportation.

5.2 | Travel companions

Nearly all respondents stated that they travelled with others, only 47 reported travelling alone. It was possible to choose multiple answers, and most reported travelling with family or relatives. Within this group, travelling with children was most common (827), and thereafter partner (293), siblings (237), parents (200), and cousins (113). Travelling with friends was less common (293), while 390 reported that they travelled with people from their village or neighbourhood (see Figure 2).

From the open-ended questions, we understand that many also travelled with people they met on the way, stating such as: 'I came with other people that I met on the way'[4] and 'We were very many. My family relatives and other people we met on the way'. Describing his journey in detail, an elderly man explained how he had travelled in different group constellations at different times, and why they had taken a particular route:

> We started the journey as two families because people left at different intervals, but we got many people [on] in Karagba. This is because that was the safe road, and it was the shortest from Umbaci and Iwotoka. If we had used Kaya Road, it was going to be very far for us, and the children could suffer.

This and similar statements suggest that larger movements of people were common. It also resonates with the above findings, that interpersonal connections were important, for example, for navigation, journey guidance and safety. Many (424) reported they got information about safety from others. This—in combination with statements on travelling with people they met on the way—signifies that existing networks as well as *new networks*, were key factors for journey modes and routes. This importance of social networks during journeys is known from other contexts (D'Angelo, 2021), reflecting the role of people in journey infrastructures (Lin et al., 2017). Our findings here also resonate with research on migration infrastructures in West Africa, which sees social networks and socio-cultural practices as central elements, highlighting the relational nature of migration and the significance of agency (Kleist & Bjarnesen, 2023).

5.3 | Modes of transportation

When asked, most respondents stated they travelled by foot (740) and/or by bus, car or truck (968) (see Figure 2). Through the open-ended questions, we find that a lack of transportation means may explain why so many travelled by foot. Alternative explanations include accessibility, safety and the availability of roads. Some respondents also explained how they partly walked while using a vehicle for other parts of the journey.

When talking about their experiences en route, many also reported on the risks they had faced, including violence and conflict. Some also mentioned other events that influence how they travelled. Talking about the first part of the journey leading her to Juba, a woman from Bor touched upon this.

> I started from Pamai to Yuai, from Yuai to Gadiang, from Gadiang to Bor, from Bor to Juba [...]. I spent very

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[4]Due to the nature of our data, we do not use pseudonyms, but for each quote provide some demographic information about the respondent.

many days on the way. Almost nine days because our vehicle got spoiled on the way [...]. We were using the UN trucks from Bor because we had no money to use the aeroplane. [...] We didn't know the routes that could lead us to where we were going, so we had to move together.

Similarly, a 33-year-old woman explained how she and her children received help, which enabled them to change their mode of transportation.

We travelled by foot from Peri to Magiri. From Magiri I was helped by a driver and I was taken to Juba. [...] My brothers gave me money for transport to Nimule. [...] From Nimule to Elegu, I was travelling by foot. [...] I was very tired when I was coming [to Uganda].

The explanations concerning the means of transportation used do not only signify how the refugees travelled, but also why they did so and how it affected them. As the first of the two last quotes illustrates, they travelled by foot and UN trucks out of necessity, though, if they had the option, they would have boarded a flight. Likewise, the woman with children was depending on help from her brothers to secure transportation for the (200 km long) stretch from Juba to Nimule.

Although obvious, this signals an important difference between what may be called the modular and mediating aspects of infrastructures (Kleist & Bjarnesen, 2023): It is not only the infrastructures available that are relevant, but also whether and how refugees make use of them, which in this context appears to be marked by a range of factors, many of them related—but not limited—to the conflict itself. This highlight both mediative and modular aspects of migration infrastructure, where guidance and information are mediative components, shaping the journeys, and modes of transportation function as both modular and – potentially - mediative components. Yet, the specific context of conflict in South Sudan further complicates these dynamics, affecting refugees' access to and use of these infrastructures.

6 | EXPERIENCES OF VIOLENCE AND CONFLICT

As evident from the first part of our analysis, violence and conflict appear to affect the refugee's choice of routes *and* their use of infrastructures. To shed further light on the exact role of conflict and violence, we now explore our open-ended responses together with survey responses. Through the qualitative data, we find numerous narratives on how the refugees experienced conflict violence on their way. A 35-year-old woman from Yei, elaborated on witnessing several violent incidents:

We were very many because many people were leaving. We even got an ambush on the way, there was a fighting on the road and the soldiers were still hiding. There was a

woman with her husband who were travelling when they reached where the soldiers were, the woman was shot dead, and we found the dead body on the road. We just continued to Karagwa.

A 26-year-old woman from Yuai also shared her story of how people they met were hurt and killed during the journey, stating 'We were robbed by the policemen on the road. [...] [We] had to use the bush to avoid being robbed or killed.' Many were also attacked themselves, some of them several times.

These elaborations correspond to the survey results, which show that most respondents encountered, or heard about, violence or armed conflict during their journey (see Figure 3). Six hundred and thirty-one saw armed soldiers, 603 heard rumours about nearby violence, and 561 witnessed gunfire or explosions. Additionally, 268 knew someone who was killed, 208 knew someone injured by armed conflict, and 352 respondents were robbed on the way. Moreover, the survey data also indicates that these experiences affected their journey to Uganda: In addition to those indicating that it affected route changes, as indicated above, 604 said the conflict had a significant impact on their journey, 207 reported some impact, while only 181 reported little to no impact of the conflict.

This pattern resonates with the open-ended responses, where some refugees explained how the conflict and violence affected their route. A 52-year-old man from Yei, detailed how they avoided armed conflict by taking a specific route, and by travelling through the bush:

We were fearing [the other route] because the government soldiers were very tough on the civilians. When they see civilians, they shoot them. [This makes] all the civilians travel through the bush.

These and similar quotes suggest that people's travel patterns affect their exposure to violence, and indeed, that experiences of violence affect how people choose to travel. To further develop these findings, we explore the bivariate correlations between how people travelled and their experiences with violence. Our results (see Appendix: Figure A2) suggest that respondents travelling by foot ($r = 0.17$) were more likely to report that conflict impacted their journey, while respondents travelling by bus ($r = −0.25$) or truck ($r = −0.13$) were much less likely to report conflict to have impacted their journey.

Respondents travelling by foot were also more likely to report that they experienced hearing and seeing gunfire and explosions, and reported more frequent injuries and killings during their journeys. By contrast, respondents travelling by bus and truck reported less frequent experiences with conflict overall. These results may indicate that travelling by foot makes refugees vulnerable, as they are more exposed to acts of conflict or violence. Yet, it is essential to note that we do not know the causal direction of these results. It may, for instance, be that refugees in areas highly exposed to violence have few options but to travel on foot, which could increase the likelihood of experiencing violence.
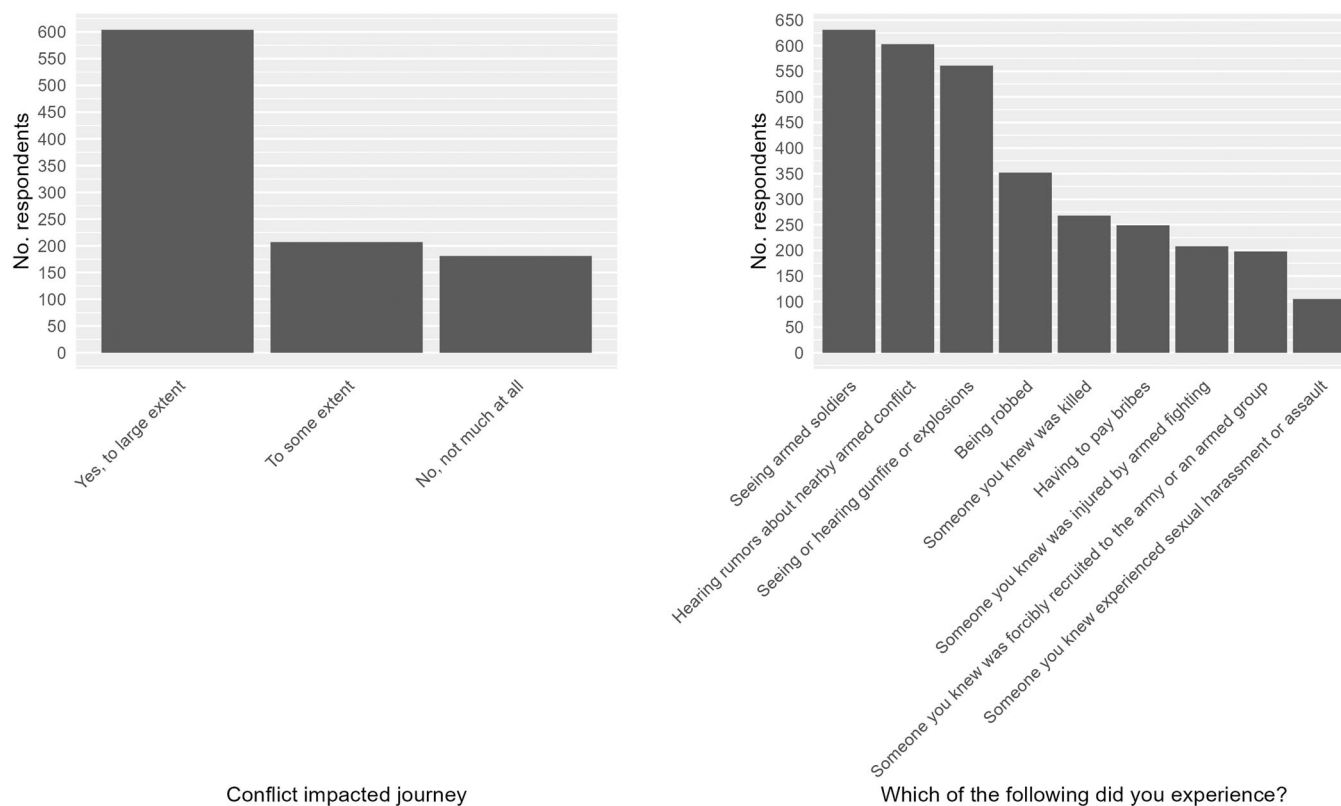
FIGURE 3 En route experiences and impact of conflict and violence.

Experiences of violence en route vary considerably across ethnolinguistic groups, with 45.7% of Nuer respondents reported knowing someone who was killed during the journey to Uganda, whereas only 9.2% of Dinka reported the same. In terms of injuries, 33.7% of Nuer respondents experienced injuries en route, compared to only nine % of Dinkas. Similarly, 70.2% of Nuer reported seeing soldiers, while only 34.6% of Dinka did. This suggests that Nuers are more frequently exposed to violence during the journey, a finding we therefore account for in the next section, when analysing journey characteristics.

Taken together, the correlations, the open-ended questions and the descriptive statistical insights, makes it clear that violence and conflict—alone and in combination with other factors—constitute a detrimental part of the infrastructures shaping South Sudanese refugees' journeys to Uganda. Factors such as information on safety and mode of transport may be anticipated parts of the infrastructures of these refugee journeys, and in line with previous literature (Xiang & Lindquist, 2014). However, these insights reveal that violence and conflict profoundly influence refugee experiences, decision-making processes, and chosen routes.

Revisiting the original concept of migration infrastructure as developed by Xiao and Lindquist, it becomes evident that an additional dimension could be integrated into the original five dimensions (commercial, regulatory, technological, humanitarian, and social) that mediate migration processes: security. Our findings suggest that conditions of violence and conflict are of paramount importance in the migration journeys and choices of South Sudanese refugees. By adding a security dimension, we acknowledge that insecurity, and the need for safety from violence and conflict, may be a key dimension affecting journeys—particularly for refugees or others fleeing conflict zones.

Our analysis has hitherto also revealed the crucial role of interpersonal connections, as for example, seen through the widespread reliance on information from fellow refugees, and the commonality of travelling with others. This signifies that there is a strong human aspect of the journey infrastructure, which only has received limited attention in previous research, and then predominantly thinking of remote, not proximate, social networks (see e.g. D'Angelo, 2021). While here, people and networks appear as key factors shaping how journeys come about. This mirrors the literature on agency during displacement (see e.g. Etzold & Fechter, 2022) as, in our data, many refugees figure as strategic actors, choosing specific trajectories and travel modes for reasons of safety, while other refugees acted as information providers, guiding some of the respondents' journey trajectories.

7 | JOURNEY CHARACTERISTICS: THE IMPACT OF CONFLICT AND TRANSPORTATION MODES

The above analyses have revealed how refugees' initial journeys within and out of South Sudan look like, and signalled how some factors shape these journeys. Yet, based on this, we cannot conclude on causal relationships in terms of how infrastructures affect the

routes taken. To explore this, the final part of our analysis employs an OLS regression framework to determine the infrastructures associated with changes in routes, while controlling for potential confounding variables. We thereafter explore how these affect journey length, duration and complexity. Doing this, we pay specific attention to the impact of conflict and means of transport, as the above analyses signal a particularly high relevance of these for refugees' experiences and journey routes.

7.1 | The impact of conflict on route changes

Given that more than 800 respondents indicated that the conflict had significant or some impact on their journey, as seen in Figure 3 above, we do a series of regression models to scrutinise how different types of impact of conflict and violence affect route changes. Each treatment variable is presented as separate models and referenced through letters (a–e) and presented in Figure 4. We first examine the relationship between the (a) self-reported impact of conflict and whether an individual needed to change their route. The findings reveal a strong positive association, indicating that individuals who encountered a severe impact from conflict en route demonstrated a higher likelihood of adjusting their route. Since the outcome variable (changed route) is operationalized as either 0 or 1, our OLS model can be interpreted as a linear probability model, with the coefficients

signifying percentages. This suggests that respondents who perceived their journeys as severely affected by conflict were 15% more inclined to report a change in route.

We then investigate the influence of experience-based violence indicators on route alterations. Among the four alternative types of experiences, three demonstrated a positive association with route changes: (b) hearing rumours of nearby armed conflict (9%), (c) witnessing or hearing gunfire or explosions (14%), and (d) knowing someone who was injured due to armed fighting (12%). The experience of (e) knowing someone who was killed on the way, did not exhibit a significant association with route modification. In the cases where a positive association was observed, individuals might have been able to foresee the necessity for route adjustment earlier, while for situations leading to severe outcomes such as killings and deaths, altering the route was likely difficult and already belated.

It is interesting to put these results in relation to the refugees' stories of how their use of different travel modes affected their exposure to violence, and going from there, how their exposure to violence affected the choices they made—hypothetically also regarding travel modes. This signals a reciprocal dynamic in the relations between refugees, the conflict setting in which they travel, and the infrastructures available to them. Revisiting the discussion of whether infrastructures shape individuals' journeys versus whether individuals shape the infrastructures they relate to, this specific case appear to be a case in point of both (Maly, 2016; Wessendorf, 2022).
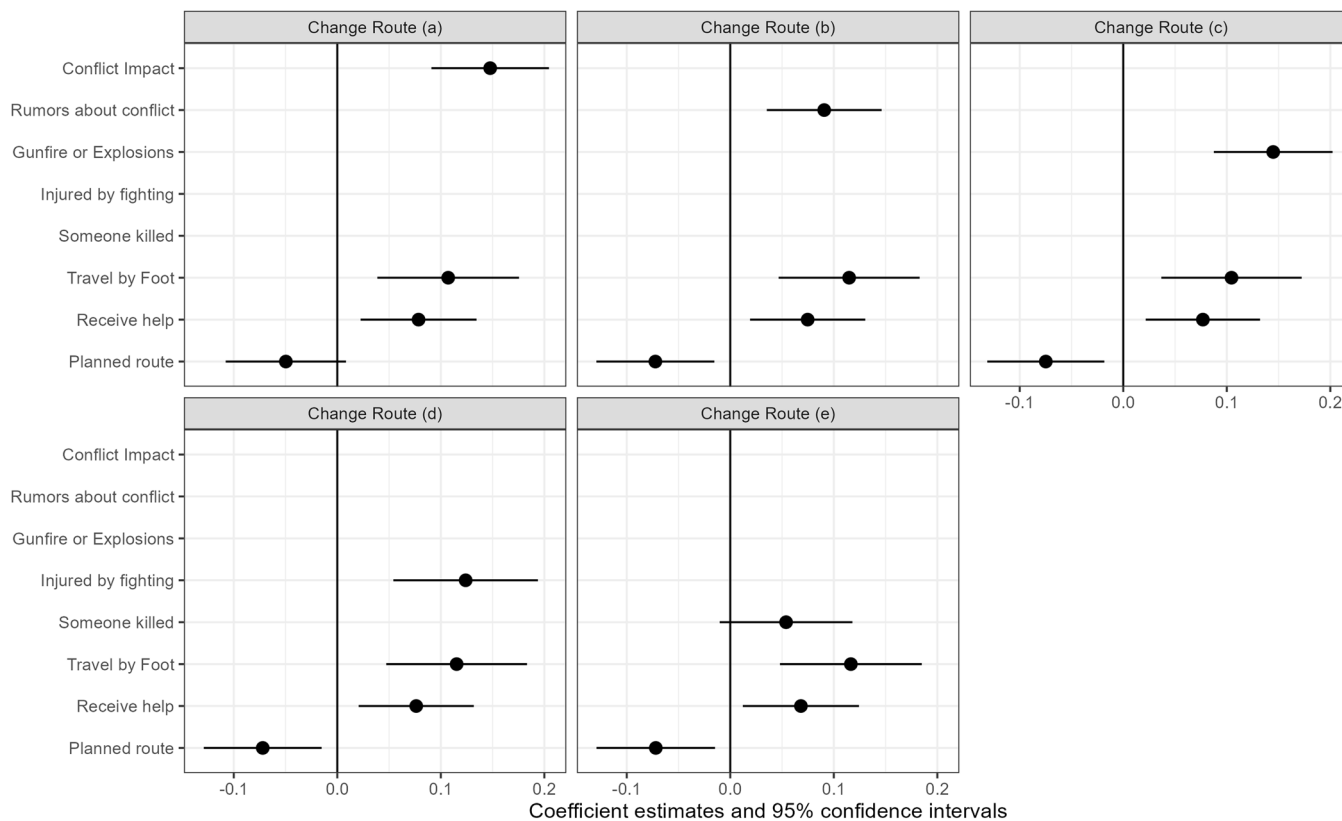

FIGURE 4 The impact of conflict and violence on changes in routes.

7.2 | The drivers of journey length, duration and complexity

Having described the impact of conflict experiences on route changes, we now analyse how various factors affect three selected outcome variables: journey length, duration and complexity. To do so, we first explore the characteristics of the journeys (see Appendix: Figure A3), finding that most respondents travel less than 500 km (panel A), on average via five central locations (nodes) (B), and most spend less than 6 months journeying (C). Exploring correlations, data suggest that the higher the number of nodes, the longer the route is (D). Travelling through more nodes is also associated with longer-duration journeys (E), and travel duration increases with longer distances up until 1000 km (F). The relationship is uncertain for longer distances, due to a lower number of respondents.

Building on this, we can investigate how other infrastructures influence journey length, duration and complexity. To do so, we model our three outcome variables as continuous variables in an OLS regression framework. By analysing the effect of individual-level and contextual factors, including the interaction between ethnicity and experiences of violence, we aim to understand better the mechanisms underpinning refugees' migration experiences. We include two factors that in the above analyses stand out as being of specific relevance, namely: encountering gunfire or explosions (Figure 3), and walking as a mode of transport (Figure 4). Although less than half of the respondents reported they received help (Appendix: Figure A1), we also include this infrastructure as we believe it is likely to impact the journey characteristics. Our models include the same set of demographic, geographic and context specific control variables as above, but we also include whether the respondents had to change their route as an explanatory variable. We do this since we believe it is likely that route changes are highly correlated with journey length, duration and complexity.

As Figure 5 shows, encountering gunfire or explosions during the journey significantly correlates with longer travel times. This suggests that exposure to violence necessitates caution, leading to delays and disruptions that extend the overall duration of the journey.

Interestingly, this correlation does not extend to route length or journey complexity, indicating that while violence impacts the time taken, it does not necessarily lead to longer distances travelled, or more complex routes. However, our results reveal surprisingly heterogeneous effects regarding ethnicity, indicating that Nuer respondents generally travel longer routes but have less complex journeys compared to non-Nuer respondents. This suggests that Nuer refugees might travel further distances, potentially seeking safer or more suitable destinations while maintaining simpler, more direct routes. The results indicate no significant difference in travel time between Nuer and non-Nuer. When exposed to violence, the interaction effect between Nuer membership and experiencing gunfire/explosions reveals that violence increases journey complexity and extends travel time significantly more for Nuer respondents than for non-Nuer respondents. This suggests that violence exacerbates travel challenges for Nuer refugees, possibly due to increased caution, more frequent stops, or additional detours specific to their ethnic group.

Walking as a mode of transport is associated with more intricate journeys. This could be due to the limitations of travel on foot since it, as explained in the open-ended excerpts, may require navigating through difficult terrains or avoiding main roads for safety reasons. In terms of receiving help, this is clearly linked to reduced travel time. Yet, interestingly, it also seems to increase both journey complexity and length. This could be because assistance could come with conditions or limitations. For instance, aid might be available in specific locations, requiring refugees to detour from their initial routes, thereby increasing complexity and length. Additionally, aid might be tied to specific travel modes or routes which may not be the most direct but those that are deemed safer, or more manageable.

The data also indicates that being forced to alter one's journey increases both the complexity and duration. This is an expected outcome, as changes may be a logic response to unforeseen circumstances or challenges, requiring detours or navigation through unfamiliar or difficult terrains. Yet, perhaps surprisingly, individuals with assets tend to have more complex journeys and longer travel times. This may be because individuals with assets can prioritise safety over speed or directness, leading them to choose longer and
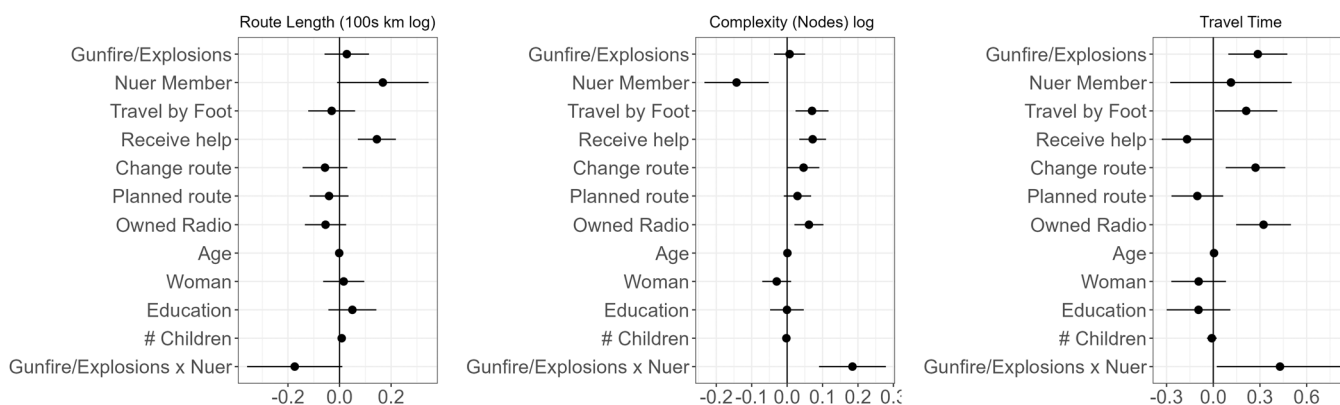

FIGURE 5 Regression results of drivers of journey length, duration and complexity.

more complex routes to protect themselves or their assets. Alternatively, these individuals might have more resources to navigate complex routes or endure longer journeys, possibly in search of better conditions or opportunities. While the reasons for this correlation are unclear, the findings nevertheless signal the multi-faceted challenges that refugees face, and how different infrastructures affect the refugees' journeys and the nuanced decisions they make on the way.

8 | CONCLUDING DISCUSSION

This paper embarked on a mission to illuminate what refugees' initial journeys within and out of conflict settings look like, and what shapes them. First, by employing unique geospatial data, we mapped refugee routes and unveiled a web of trails spanning across South Sudan. Our analysis highlighted that while refugees' journeys were diverse, they often intersected at key locations. Coupling this with other survey responses, we found that journeys were influenced not only by the violent conflict but also by interpersonal connections, safety information and the availability and choices regarding different means of transport. We found these to be crucial elements in the refugee journey infrastructures—a term we coin in this paper by drawing on previous work on migration infrastructure (Lin et al., 2017; Lindquist et al., 2012:2). Using this concept pushed us to explore which and how the infrastructures affected refugees' experiences and decisions along their journey. Our findings here also resonate with research on migration infrastructures in West Africa, highlighting the importance of personal relations, the role of agency, and how different infrastructures may play different roles when affecting, or mediating, journeys (Kleist & Bjarnesen, 2023).

Second, we honed in on refugees' experiences of violence and conflict, drawing on both qualitative and quantitative data. Perhaps unsurprisingly, we found that experiences of violence and conflict were considerably affecting most journeys. Directly and indirectly, alone and in combination with other factors, we found conflict and violence to signify a key dimension of the refugee journey infrastructure, since it shaped refugees' opportunities, choices and, thereby, trajectories.

Considering the findings of the two first analyses, we finally applied an OLS regression framework for a closer examination of the characteristics of these journeys, including the drivers of journey length, route complexity, and duration. We found that exposure to violent conflict significantly impacted route changes, complexity of the journey, and the overall travel time. Moreover, the means of transport—specifically travelling by foot—appeared to be associated with increased exposure to violence.

While some of our findings might seem intuitive, our documentation and analysis serve to foreground the little-known geographies and experiences of refugees' journeys 'to safety'. A first contribution this paper offers lies in its mixed-methods framework, where the triangulation of innovatively mapped geospatial data, quantitative survey insights and open-ended questions has enabled new insights

to the geographies of refugee journeys. As such, this paper makes significant contributions to geospatial research methodologies and the study of refugee journeys. In terms of the latter, the paper's findings add new insights by focusing on the often-overlooked (parts of the) journeys, namely those taking place within a country of origin, and in a context of conflict affected, south-south displacement. Our analysis also enriches the body of work on conflict-related migration, offering unique spatial and empirical insights into the journey experiences of a specific group of refugees.

A second contribution of this paper lies in our conceptualisation of refugee journey infrastructures, which adds to broader theoretical work in migration and refugee studies. In the specific case of refugee journeys in South Sudan, we have underscored the role of existing infrastructures, such as transportation modes and travel assistance from bodies like the UNHCR. More importantly, we have highlighted the decisive roles played by experiences of conflict and violence, and thus introduced the 'security dimension' to the migration infrastructures concepts. Our finding on the importance of interpersonal connections—for example, information and guidance from fellow travellers, and the refugees' own active and strategic engagement with infrastructures, reflect the complex interaction of their agency, the infrastructures, and the conflict-heavy contexts they navigate in. While the infrastructures approach has been used to integrate the roles of agency and structure in migration research, this has to our knowledge not yet been done in relation to refugee journeys.

Beyond expanding geographical and theoretical research on refugee journeys, the paper's third contribution is its potential for practical implications. At a general level, our research indicates that violence, refugees' socio-economic conditions, and information about safety significantly shape refugee journeys. While this paper has not focused on the humanitarian response to refugees in South Sudan and en route to Uganda, our findings suggest that interventions to support refugees while they travel within their country of origin, would benefit vulnerable groups. Our findings highlight the critical role of information sharing on the ground and during journeys—which is often facilitated by fellow refugees. This underscores a need for recognising and engaging with local societies and refugees, to provide humanitarian responses to displacement, not only in Uganda (Pincock et al., 2020), but also while travelling towards Uganda, in areas marked by violence and conflict. These insights call for further research on refugee journey dynamics in other conflict-ridden contexts, thus further developing knowledge about refugee journey infrastructures.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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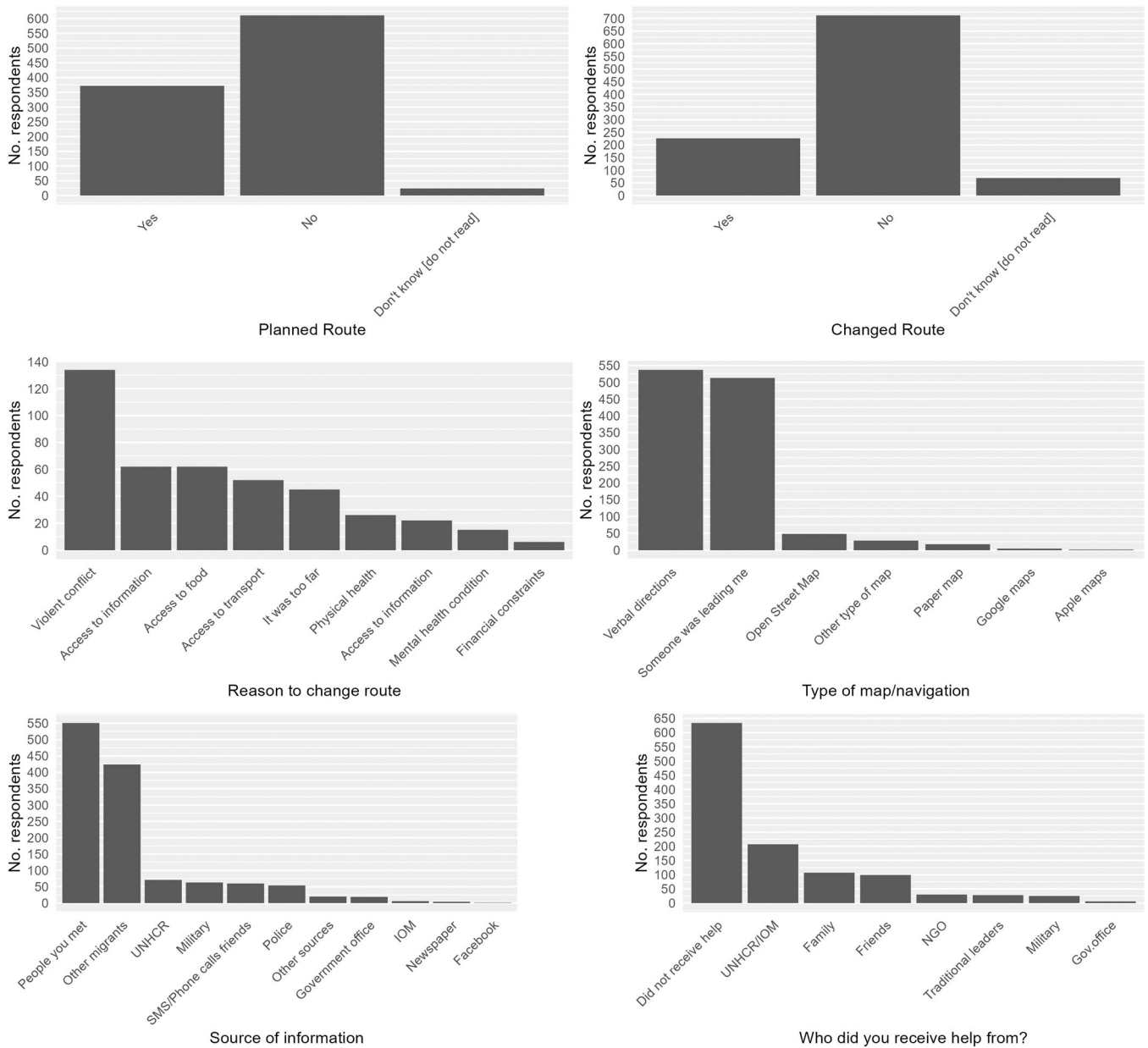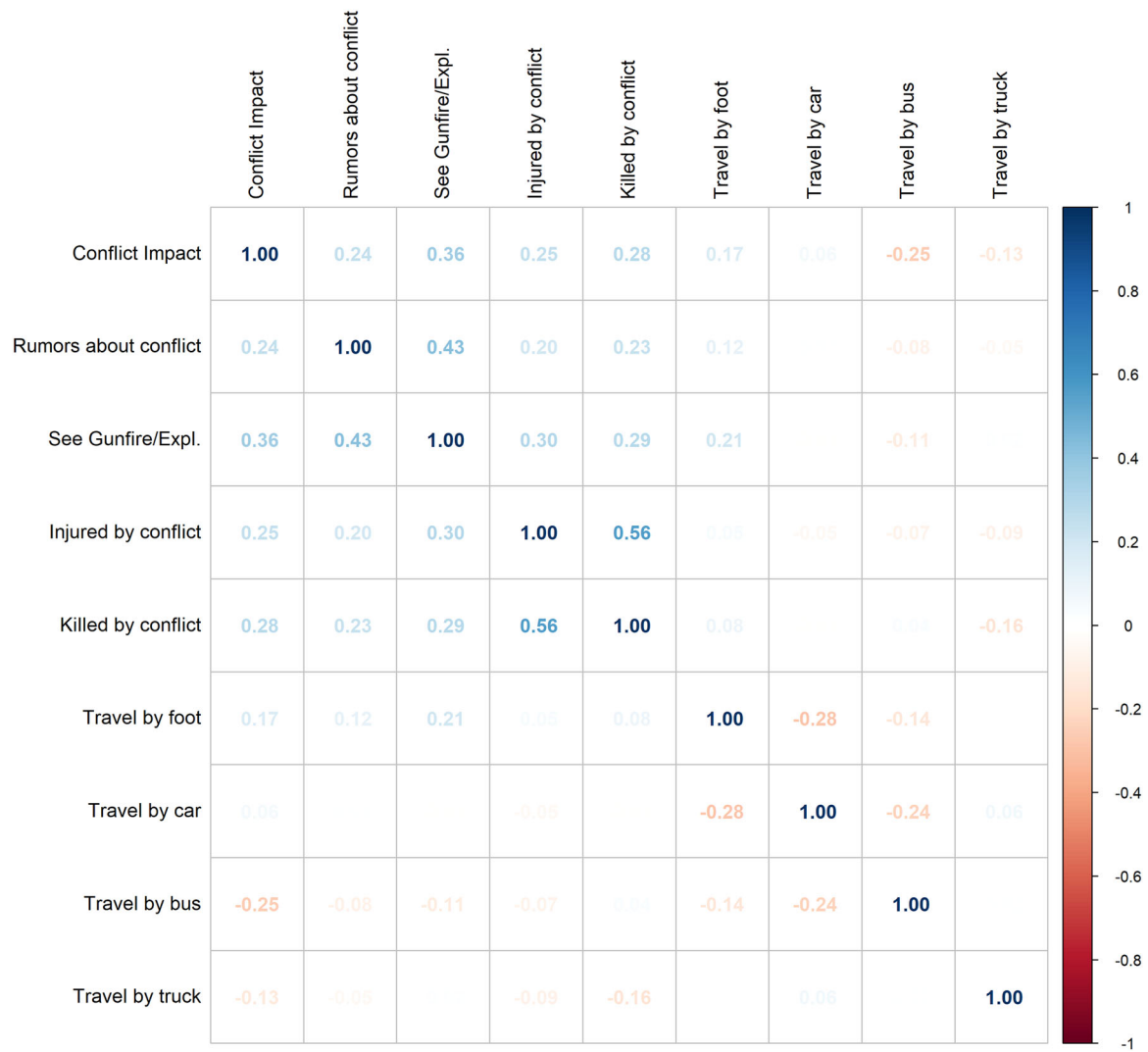
APPENDIX A

See Figures A1–A3.

FIGURE A1   Route dynamics and relative importance of journey infrastructures.

	Conflict Impact	Rumors about conflict	See Gunfire/Expl.	Injured by conflict	Killed by conflict	Travel by foot	Travel by car	Travel by bus	Travel by truck
Conflict Impact	1.00	0.24	0.36	0.25	0.28	0.17	0.06	-0.25	-0.13
Rumors about conflict	0.24	1.00	0.43	0.20	0.23	0.12		-0.08	-0.05
See Gunfire/Expl.	0.36	0.43	1.00	0.30	0.29	0.21		-0.11	
Injured by conflict	0.25	0.20	0.30	1.00	0.56	0.05	-0.05	-0.07	-0.09
Killed by conflict	0.28	0.23	0.29	0.56	1.00	0.08		0.04	-0.16
Travel by foot	0.17	0.12	0.21	0.05	0.08	1.00	-0.28	-0.14	
Travel by car	0.06			-0.05		-0.28	1.00	-0.24	0.06
Travel by bus	-0.25	-0.08	-0.11	-0.07	0.04	-0.14	-0.24	1.00	
Travel by truck	-0.13	-0.05		-0.09	-0.16		0.06		1.00

FIGURE A2 Bivariate correlations between conflict experiences and modes of transport.
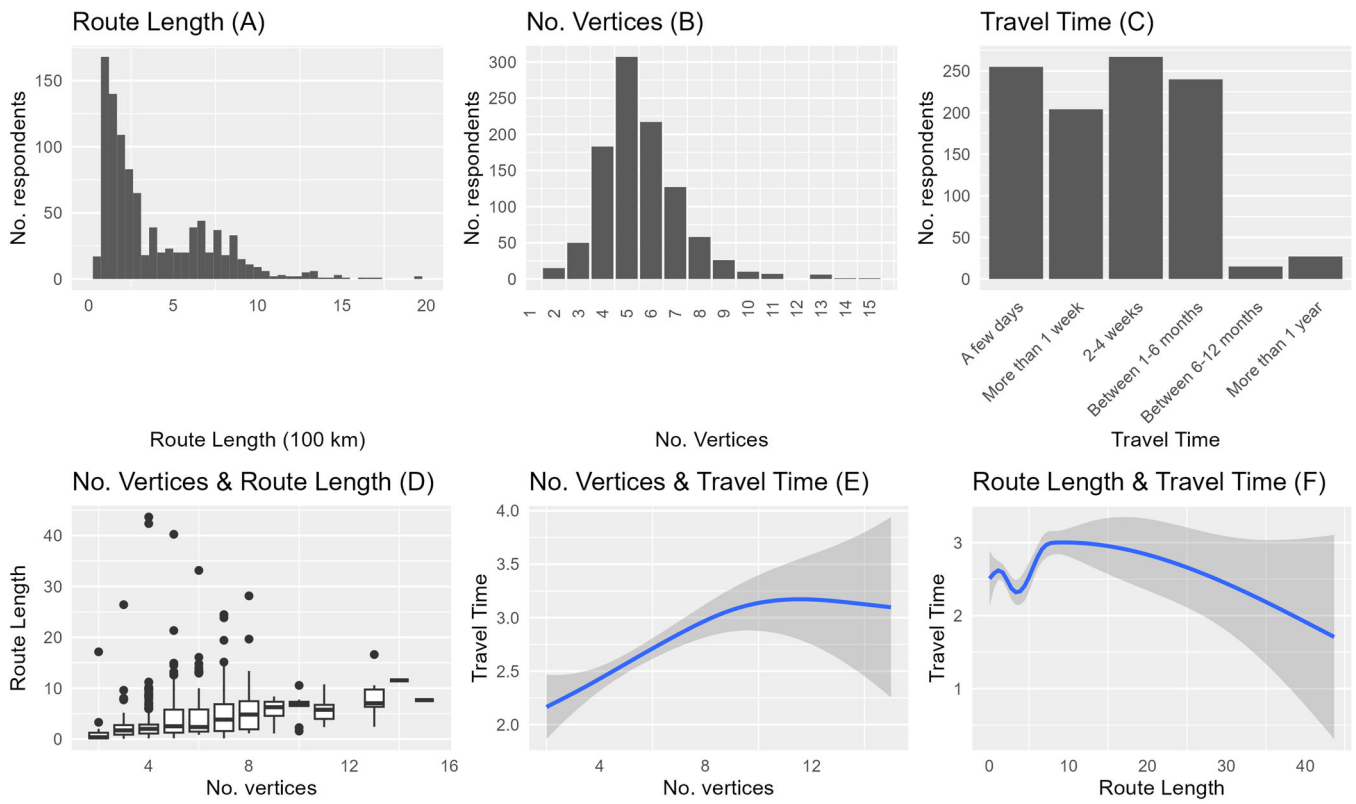
FIGURE A3 Descriptive statistics and correlations of route length, complexity, and travel time.