

Validating explanatory qualitative research: Enhancing the interpretation of interviews in urban planning and transportation research

Petter Næss

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Abstract

The literature on qualitative interview methodology includes little guidance on how to use interviews for explanatory purposes. Still, within many fields of research, explanatory interview research could play an important role, sometimes in combination with quantitative methods on research topics where the latter methods have traditionally been dominant. Using a study of influences of built environment characteristics on travel as a case, this paper shows an example of how such explanatory interviewing and interview interpretation could be done within a mixed-methods framework. A key tool in the study used as an example was an interpretation scheme developed for explanatory purposes. The interpretation scheme requested the researchers to write down what could be inferred from each interview as answers to each sub-question derived from the main research questions of the study. The scheme was at the same time flexible, allowing sub-questions to be included if new aspects relevant to the topic were discovered during the interviews. While obviously not being the only way to carry out explanatory qualitative interview research, the method has proven to be fruitful in a number of studies on built environment and travel over the last fifteen years.

Keywords: qualitative interviews; interpretation; explanation; built environment; travel behavior

1. Can qualitative interview research be explanatory?

Using a study of influences of built environment characteristics on travel as a case, this paper shows an example of how interviewing and interview interpretation aiming at explanations could be done within a mixed-methods framework. This method has been applied successfully in a number of studies on built environment and travel over the last fifteen years. However, very few, if any textbooks on qualitative interview research focus on explanation as a purpose of interview interpretation. Some literature advocates entirely descriptive accounts, aiming at thick micro-level description, but with little connection to pre-formulated theoretical propositions (e.g. Glaser & Strauss, 1967). Other scholars consider qualitative interviewing mainly as an exploratory method, aiming at discovering unexpected things and a 'bottom-up' way of generating research questions within loosely defined topics (e.g. Minichiello, 1990). Still others hold that qualitative interviews should be a setting for gaining insight into the interviewee's deep emotions and developing mutual empathy between the interviewer and the interviewee (e.g. Gubrium & Holstein, 2003). Others again more or less reject the possibility of gaining knowledge about any substantive issues 'out there' through the interview. Instead, these scholars focus

on what the interview can reveal through the ways in which the interviewer and interviewee express themselves, and possibly how their use of language and concepts can tell something about discourses at a societal level (e.g. Talja, 1999).

Understanding and meaning-making, as opposed to explanation, is often emphasized as the main purpose of interview interpretation (Maxwell & Mittapalli, 2008; Bhattacharya, 2008). Qualitative interview researchers are often advised against 'why' questions (Brinkmann, 2008). Some interpretivist scholars instead hold that research is a moral and practical activity resembling the forms of inquiry practiced by novelists, journalists, and ordinary people in their daily lives, and that reality is always something we make or construct, not something we find or discover (Smith, 2008).

The above-mentioned ideas about the purposes and outcomes of qualitative interview research do not leave much scope for interviews as an explanatory endeavor. Some scholars explicitly refer to a dichotomy between causal explanation and interpretive understanding commonly held within the hermeneutic tradition (Bransen, 2001), or consider the entire concept of causality as illegitimate or inappropriate in qualitative research (Lincoln & Guba, 1985). There also seems to be an implicit methodological individualism in much of the mainstream theorizing about research interview methodology (Alvesson, 2011:4). However, while methodological individualism tends to downplay or ignore the influences of various kinds of social structures on individuals' scope for actions, the very aim within many fields of research is to contribute to improve theorizing about the impact of different kinds of social structures on people's subjective dispositions. Today, purely quantitative approaches dominate within many such research fields. The negative attitude towards explanation in mainstream qualitative methodology literature arguably contributes to perpetuate this unfortunate situation.

For research where theoretical considerations and/or prior quantitative studies suggest the existence of certain causal influences but these relationships are contested, qualitative research explaining the causal mechanisms at work is important. Such explanatory qualitative research is also necessary to improve the quality of quantitative studies and to avoid statistical model misspecification. Doing such research solely by quantitative methods is unsatisfactory for many reasons, particularly because the statistical analyses are unable to demonstrate the existence of any causal influences. Without input from qualitative research that can identify causal mechanisms and processes, quantitative studies are vulnerable to model misspecification, since there will be poor basis for deciding which control variables to include, their order in a causal chain and whether the influences between variables are unidirectional or bidirectional.

A few qualitative methodologists do deviate from the mainstream disinterest in or rejection of causality by supporting explanatory qualitative research (e.g. Danermark et al., 2001; Maxwell, 2004; Maxwell & Mittapalli, 2008; Cresswell, 2003; Cresswell & Plano-Clark, 2006). Their understanding of causality and explanation differ from the widespread Humean conceptualization of causality in terms of constant conjunctions and the Hempelian conceptualization of deductive-nomological explanation. Instead, they lean towards (critical) realist understandings of causality as tendencies operating in more or less open systems (Bhaskar, 2008; Sayer, 1992).

Although some theorizing about the relevance of explanatory qualitative research exists (cf. above), little guidance exists on methods for conducting and interpreting explanatory qualitative research interviews. The purpose of this paper is to make a contribution to such guidance by showing an example

of the explanatory qualitative interview research methods used in a recent Norwegian mixed-methods study of influences of built environment on travel.

2. An illustrative example: explanatory qualitative interview research on built environment and travel

Research on influences of urban built environment characteristics on travel is indeed a research field where explanatory qualitative research is called for. Mainstream researchers within this field typically investigate relationships between the built environment and travel by conducting statistical analyses controlling for a host of demographic, socio-economic and even attitudinal variables. However, this approach runs the risk of concentrating the attention on other built environment characteristics than those exerting the strongest influence on travel behavior (and failing to control for the latter). It also runs the risk of omitting other relevant control variables and/or including irrelevant control variables in the statistical analyses (Næss, 2015).

A few researchers have conducted studies combining a quantitative approach with qualitative interviews (Røe, 2000 and 2001; Tillberg, 2001; Næss & Jensen, 2004; Næss, 2005 and 2013), and some other researchers have alternated between quantitative and qualitative studies (Scheiner, 2005; Scheiner & Holz-Rau, 2013). Only very few papers have explicitly focused on the advantages and challenges of applying qualitative interviews as a method within this field of research (Røe, 2000; Clifton & Handy, 2001), however without being very specific about the more detailed methodical steps that can be followed in such studies. The present paper aims to take the discussion about the role of qualitative interviews in studies of built environment and travel a step further by offering an example of the use of interviews with an explanatory purpose in a recent study of residential location and travel in the Oslo and Stavanger metropolitan areas in Norway.

Compared to mainstream research into relationships between built environment characteristics, this study (Næss et al., 2017a) is methodologically novel in that it applied a combination of quantitative (travel survey) and qualitative (in-depth interviews) research methods and conducted cross-sectional as well as longitudinal analyses. An important strength of the mixed-methods design of this study is its better ability to identify causal mechanisms than in studies relying solely on travel survey data. The qualitative interviews provide insight into the backgrounds, motivations, and justifications that agents draw on when they make transport-relevant decisions about their participation in activities, location of these activities, modes of transportation, and the routes followed. In our research, we referred to these backgrounds, motivations, and justifications as *transport rationales*, drawing on earlier work by Beckmann (2001) and Næss & Jensen (2005).

In accordance with the theorists who have defended explanatory qualitative research and with the philosophy of science position called critical realism, our study was based on an understanding of causality as *tendencies* operating in non-closed systems (Bhaskar, 2008). According to critical realist ontology, objects have properties enabling them to exercise certain forms of impacts on other objects and/or make them receptive to certain kinds of influences from other objects. Critical realists conceive of reality as consisting, with a few exceptions such as in natural science experiments, of more or less open systems where empirical regularities rarely occur spontaneously. Critical Realism acknowledges human agents, social structures as well as the natural environment as capable initiators of mechanisms that might (or might not) result in the empirical events or situations that we as researchers try to make

sense of. Causal mechanisms can also include individuals' attitudes and knowledge, as well discourses influencing people's beliefs, attitudes and practices. Critical Realism's conceives of the events and situations that occur as the results of the combined causal mechanisms working in the actual situation. Many different causal powers operate at the same time. Some augment each other, others counter each other, and some are only actuated under the influence of other causal powers. All this differs with the specific context (Bhaskar, 2008). This conception fits well with the multiple-cause situation a researcher is facing when trying to explain travel behavior.

The study aimed at answering the following research questions:

- Through which causal mechanisms do built environment characteristics influence travel behavior for commuting and non-work purposes?
- Are the influences of built environment characteristics on commuting and non-work travel similar or different?
- Are the built environment influences on travel the same in more monocentric as in more polycentric urban contexts and across city sizes, and if not, in which way do they differ?

The qualitative interview material contributed primarily to answer the two first of these questions.

Oslo, the capital of Norway, has around 1 million inhabitants within the continuous urbanized area (the morphological city) and about 1.4 million inhabitants within the functional urban region. Stavanger and the neighboring town Sandnes, which together make up a continuous urbanized area, is Norway's third largest city with around 215,000 inhabitants and a population in the functional region of about 340,000. Oslo is a relatively monocentric urban area, with one dominant downtown area where many jobs, service, entertainment and cultural facilities are concentrated. In contrast, Stavanger has a clearly more polycentric employment structure, with job concentrations particularly in a suburban employment center developed since the 1970s but also in the central part of Stavanger and (to a lesser extent) in the neighboring town center Sandnes. However, the dominant center for service, entertainment and cultural facilities is still the downtown area of Stavanger.

The data collection of the Oslo and Stavanger studies took place in the summer of 2015. We sent invitation letters for the web-based questionnaire survey to 15,000 addressees in each metropolitan area. We received around 3400 acceptably completed questionnaires. Although not very high, the response rate is within the mainstream for studies on this topic. We recruited participants of the qualitative interviews among questionnaire respondents who had stated their willingness to be interviewed. When selecting interviewees, we considered it important to include persons in each city region living at different types of residential locations (inner-city, close to second-order center and non-central), and to include persons from different population groups regarding household composition, employment and education. Thirty-three interviews were carried out, seventeen in the Oslo and sixteen in the Stavanger metropolitan area. The interviews usually took place in the homes of the interviewees, and except two interviews, there were always two interviewers present. We conducted the interviews following a semi-structured interview guide addressing eleven specified topics. Together with a brief information about practical issues concerning the interview, the eleven topics were listed in the invitation letter sent before the interview to the persons who had volunteered to participate.

The conduction of the interviews

The topics addressed in the interviews were chosen based on theoretical considerations and experience from our previous projects on residential location and travel. Besides the brief information in the invitation letter, which filled the role as an interview guide for the interviewees, we had written a much more detailed 'back-stage' interview guide to be used for our own preparation for the interviews. This document included the main questions and possible follow-up questions that should be asked during the interviews. This background document was intended as a flexible framework, and we usually only looked at it once, towards the end of each interview, to check whether there were any important issues that had not been addressed. As part of the preparation for each interview, we also reiterated the information given by the interviewee in the questionnaire surveys. By doing so, we could avoid spending interview time asking for information already given in the survey and instead have more time available for talking about the interviewees' motivations, considerations and opinions.

During the interviews, a map of Greater Oslo (or the Stavanger region) was placed on the table so that interviewers and the interviewee could point at places on the map and identify locations talked about. Before starting addressing issues included in the interview guide, we invited each interviewee to speak freely for some time about her thoughts concerning the residential neighborhood, its location, her traveling habits, and how these aspects of her daily life might be related.

All interviews were tape-recorded and transcribed word by word. For some interviews (eight of the 33), short field notes were written immediately after the interviews, stating the interviewer's main impressions. This was unfortunately not done for the remaining interviews¹, but the interviewers anyway talked together afterwards about the information given by the interviewee.

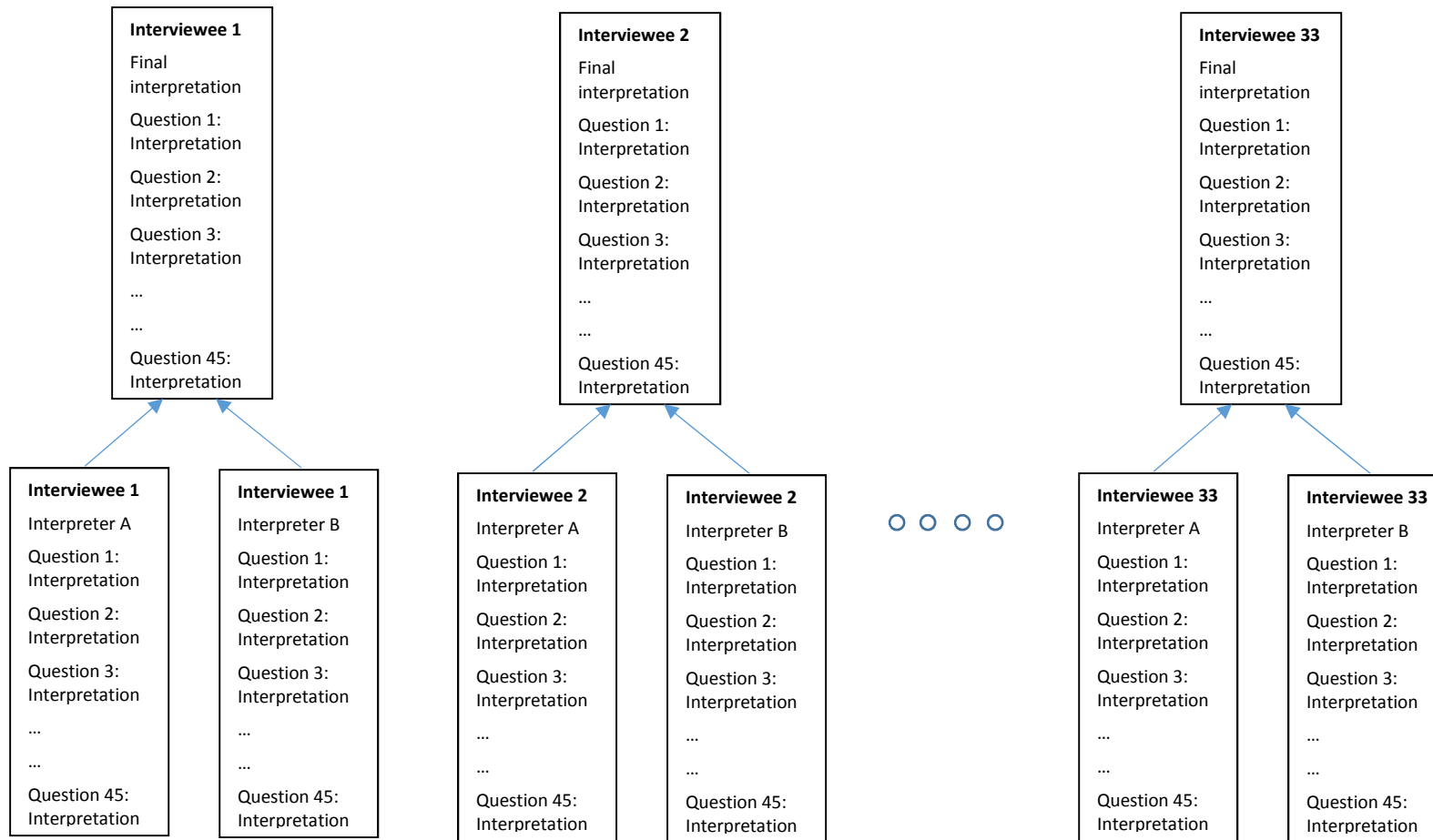
The interpretation scheme

For the interpretation of the interview material, we used an *interpretation scheme* inspired by Robert K. Yin's (1994) case study protocol principle of "linking propositions with data". This scheme originally comprised 37 research sub-questions that we, as researchers, tried to answer, based on the information given by the interviewees. During the interpretation work, the number of questions increased to 45 (see Appendix 1). Some of the questions were of a purely descriptive nature, but the answers to these questions were necessary to be able to answer other, analytic questions included in the interpretation scheme. The latter questions were of course the theoretically interesting ones.

When interpreting the interviews, we normally used only the written text as a base, but in a few occasions when we were uncertain whether the transcriber had understood correctly what the interviewee was saying, we also checked the audio files. Each interview was interpreted separately by two members of the four-person project team. Each interpreter thus wrote what the particular interview could tell about each of the 45 research sub-questions. The two interpreters of each interview subsequently discussed their interpretations and produced a common interpretation. Figure 1 illustrates the procedure when interpreting the individual interviews.

¹ The scheduling of interviews was tight, and we often had to hurry directly from one interview to reach the next one, using public transportation. This made it difficult to establish any routine of writing field notes immediately after each interview. However, looking back, I realize that we could have benefitted from producing such field notes in the evenings after each day of interviewing.

Figure 1: The procedure for the interpretation of individual interviews



We drew explanations out of the interview material mainly from

- interviewees' information about their routine activities and their traveling to reach these activities,
- the stories they told about changes in activity pattern, travel behavior and car ownership after moving,
- their thoughts about the dwelling and residential neighborhood and their considerations about the reasons for choosing to live where they live,
- their considerations about how their travel behavior and activity pattern would hypothetically be if they lived at a different kind of residential location, and
- their considerations about acceptable distances to jobs and other facilities.

A particular and challenging endeavor in the interpretation process was to try to elicit what each interview transcript could tell us about the interviewees' *transport rationales* (cf. above), i.e. their motivations, reasons and justifications for activity participation, location of their activities and their modes of travel. As mentioned above, causal mechanisms can include individuals' attitudes and knowledge. Acknowledgment of the importance of interpretive understanding thus does not prevent inclusion of causal explanations in explanations of "purposeful action". Reasons may themselves be plausibly construed as causes (Bhaskar, 1998; Fairclough, Jessop, & Sayer, 2002). Notably, the interviewees' transport rationales are important contributory causes of their travel behavior, in interplay with urban structural characteristics and time-geographical constraints (Hägerstrand, 1970). The travel behavior of two individuals living in the same area and with similar socio-demographic characteristics and similar family and organizational commitments may differ considerably, depending on their transport rationales. On the other hand, individuals with similar transport rationales and socio-demographic characteristics and commitments may show very different travel behavioral patterns, depending on the urban structural situation of the place they live. Transport rationales may also influence and/or be influenced by residential location (for example, through residential self-selection or by adapting habits and attitudes to what is facilitated by the residential situation). We therefore tried to be aware of any geographical differences in the transport rationales of the interviewees².

The rationales were normally not something that the interviewees stated explicitly in the interviews. They were inferred by us, the researchers, based on what the interviewees told about their present and previous workplaces, acceptable commuting distances if they were to find a new job, location of outdoor recreation activities, choices of stores, restaurants, cultural facilities etc., and their statements about whether their activity pattern and/or travel behavior would change if the interviewees lived at a different kind of residential location.

When trying to answer the questions of the interpretation scheme, we sometimes used a mode of thought operation known as *retroduction* (Bhaskar, 2008). Retroduction is a way of thinking where one attempts to explain events and situations by postulating (and identifying) the

² Such possible influences between residential location and transport rationales is one of the reasons why we chose to do the synthesizing of interview interpretations in three steps (see below), where we first synthesized separately for interviewees living in three different urban structural situations in each city region

mechanisms which are capable of producing them. Both during an interview and in the subsequent interpretation, we could, for example, ask ourselves: What must be the underlying condition that makes sense of this particular statement by the interviewee?

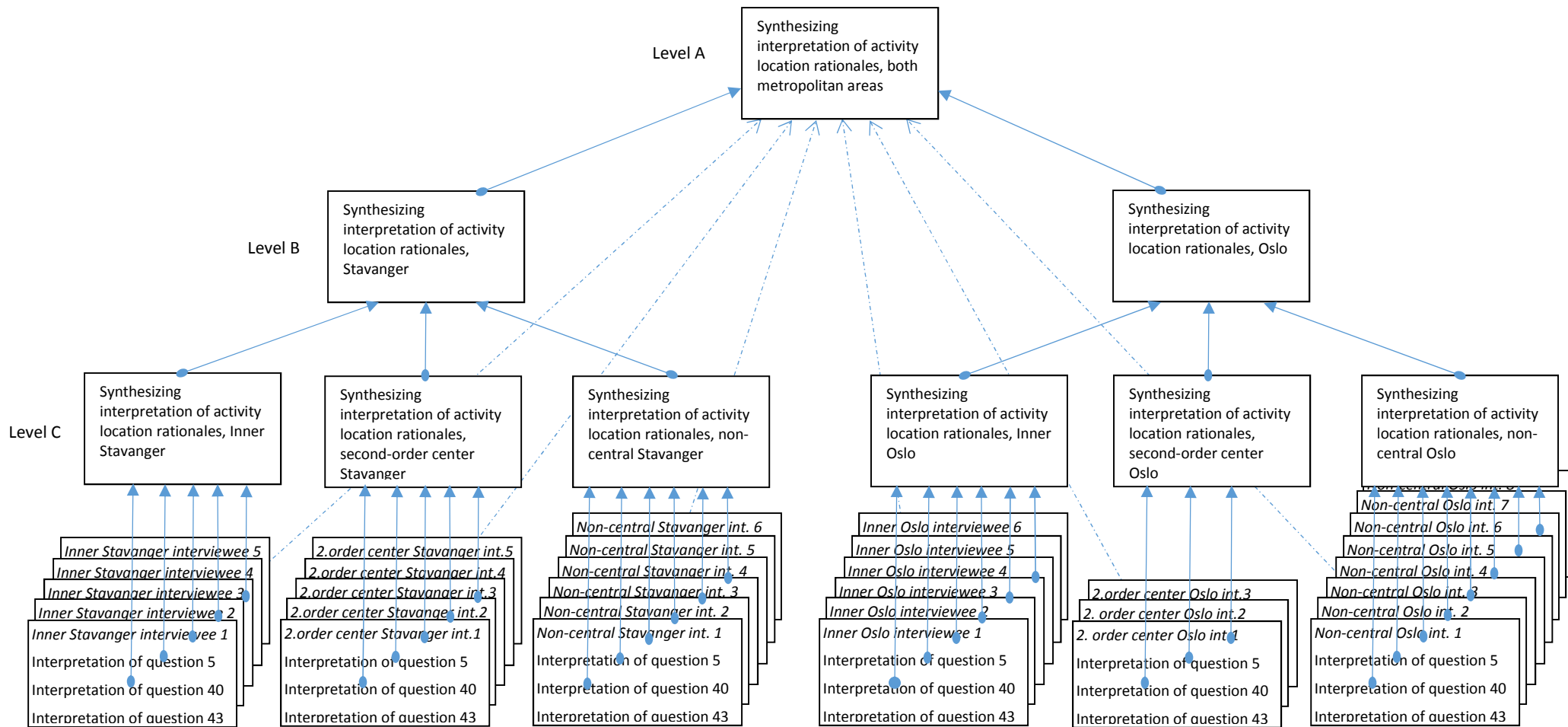
For example, an interviewee who was about to move from an inner-city apartment to a suburban single-family house said that he would probably continue to go to many of the same destinations also after moving (for example an inner-city vegetable market and restaurants he considered to have a particular atmosphere and which was easily accessible for his group of friends). For this statement to make sense, the interviewee must consider that the quality of the facilities was more important than proximity, at least within some quite wide threshold distances. His mentioning of atmosphere as important for choosing restaurants must imply that his choices of locations of activities were based not only on the pure instrumental purpose (the price and quality of the food) as a quality criterion, but also on more 'intangible' elements such as the 'atmospheric' quality. Moreover, the fact that the interviewee mentioned that he would go to restaurants easily accessible for his friends indicated that a rationale of maintaining social contacts was also in play when choosing the location for the activity of going to restaurant.

During an interview, such retroductive reasoning could lead to follow-up questions to check whether the provisional explanations we had developed this way were correct. In the subsequent interpretation of the interview transcript, we could check the plausibility of the preliminary explanation against other statements in the same interview and our general knowledge about the urban structural characteristics of the neighborhood and the city.

In addition to the information given in the qualitative interviews, we also drew on the interviewees', as well as the general respondents', answers to questionnaire questions about acceptable distances to jobs and other facilities, and their stated tradeoffs between commuting time, job content and salary.

For the interpretation across the 33 interviews, the 45 research sub-questions were grouped into fourteen question groups (Appendix 2), where each interview team member had the responsibility for synthesizing some question groups, varying from one to six groups per interpreter. In addition, another team member acted as a reviewer of each synthesizing interpretation, giving comments and suggesting improvements before a final version was made. The cross-interview synthesizing was made in three steps: First, at level C, a separate synthesizing was made for the interviewees living within each of three different kinds of locations in each of the two city regions (inner-city, close to second-order center, and non-centrally). Second, we made a synthesizing across location types but separately for each city region (level B), and finally a total synthesizing for both the Oslo and Stavanger case (level A). Figure 2 illustrates the procedure for synthesizing across interviews for one of the fourteen question groups: Rationales for activity location. This 3-step procedure of upward synthesizing (shown with solid arrows) might entail risk of losing some nuances if the synthesis at each level were to be based only on the synthesized text at the level immediately below. Therefore, when making the final synthesis (level A) for a given question group, we looked back at the interpretations of each question for each individual interviewee. This is indicated by the dashed arrows in Figure 2 and can also be seen in Appendix 3, which shows an excerpt of the final synthesizing for the question group Rationales for activity location.

Figure 2: The procedure for synthesizing across interviews for one of the fourteen question groups: Rationales for activity location.



Transport rationales for activity location and travel mode choice – an example

As mentioned above, the transport rationales make up important links in the mechanisms by which built environment characteristics influence travel behavior. Here, we will only give a very brief example of how rationales identified in the interviews were used in explanations of such relationships. For more details, see Næss, Peters, Stefansdottir & Strand, 2018; Næss, Strand, Wolday & Stefansdottir, 2017a.

We encountered the following rationales for *activity location* in the interviews:

- Minimizing the friction of distance (all interviews)
- Choosing the best facility (all interviews)
- Maintaining social contacts (nearly half of the interviews)
- Limiting other travel-related expenses (a few interviews)
- Variety seeking (several interviews)

Among the rationales for activity location, the rationale of choosing the best facility tended to make people less tied to their neighborhood or local urban district, whereas the rationale of minimizing the friction of distance tended to make them more locally oriented. The former rationale tended to be important particularly to the location of the interviewees' workplaces but also for several, more specialized, leisure and cultural activities. The latter rationale was more important for non-specialized facilities such as grocery stores or kindergartens, and tended to make people prefer to use available facilities within their local area rather than travel farther away in search for a higher-quality store or kindergarten. The remaining three rationales had more ambiguous effects on the interviewees' prioritization between local or non-local activity opportunities, but anyway contributed to make those living close to some sort of urban center (the downtown area or a local center) travel less than those living at non-central suburban locations.

We identified the following rationales for choices of *modes of transportation*:

- Main rationales:
 - Convenience and comfort
 - Time saving
 - Frustration aversion
- Other rationales:
 - Physical exercise
 - Long-lasting habits
 - Limiting travel expenses
 - Safety
 - Social contact and caretaking
 - Esthetics
 - Environmental concerns

In addition, *distance overcoming* was identified an important intermediate criterion for choice of travel mode. This purpose triggers the rationale of avoiding too great physical effort as well as the time-saving rationale to be activated.

Only a few of the rationales for travel mode choice seem to substantially affect the influences of residential location on travel modes. This applies mainly to the rationale of time saving, and partly also the rationale of frustration aversion, both contributing to more frequent car travel among suburbanites.

Most of the remaining rationales affect this tendency in a less clear way; some can strengthen as well as weaken this relationship, depending on the specific context.

The rationales identified for activity location and travel mode choice enabled us to explain, for example, why the amount of car travel tends to depend more on the distance from the dwelling to the main city center than to local centers. For most travel purposes, most people do not necessarily choose the closest facility, but rather they travel a bit further if they can then find a better facility. This is especially true as regards workplaces. Travel distances therefore depend more on the location of the dwelling relative to large concentrations of facilities than on the distance to the closest facilities. People who live close to the city center have a large number of facilities within a short distance from the dwelling and therefore do not have to travel long, even if they are very selective as to the quality of the facility. Since travel distances are often short, inner-city residents carry out a higher proportion of trips by bike or on foot.

3. Reflections on the merits of the method

The chosen method has enabled us to draw more solid conclusions about causal influences of the built environment on travel than would have been possible with a traditional approach. They have also enabled us to go deeper into impacts of built environment characteristics on opportunities for activity participation and on physical activity. The interviews and the interpretation process have produced an extremely rich material that has so far been utilized in seven papers from the Oslo and Stavanger study accepted or under review³. Two of these papers focus entirely on the qualitative material (Stefansdottir, 2017; Næss, Peters, Stefansdottir & Strand, 2018). In six other papers, parts of the qualitative material are used to explain the patterns found in statistical analyses (Næss, Strand, Wolday & Stefansdottir, 2017a; Næss, Cao & Strand, 2017b; Wolday, Cao & Næss, 2018a; Ding, Cao & Næss, 2018b; Stefansdottir, Næss & Ihlebæk, submitted; Cao, Næss & Wolday, submitted). More papers are underway, some focusing entirely on the qualitative material but for most papers the qualitative parts are used to explain the statistical results.

The qualitative interviews (in the Oslo and Stavanger study as well as in our preceding studies) helped to identify and justify the choice of variables to be included in the statistical analyses. For example, based on the interviews in Oslo and Stavanger, we included two more urban structural variables (which we had to construct and measure at a later stage than for the other variables) in some of these analyses.

In particular, the method has improved our understanding about the relative importance of proximity to the main city center, proximity to more local centers and local neighborhood characteristics in influencing travel behavior for different purposes, and the role of attitude-based residential self-selection as a possible source of error when investigating influences of residential location on travel. In the latter case, the interview material has provided a basis for arguments against the widespread assumption, particularly in American literature on land use and travel, that a main reason for observed

³ In addition, two papers were published in the beginning of the research study, discussing in what sense the built environment can be said to exert causal influences on travel behavior and advocating a combination of qualitative and quantitative research methods to address causal relationships at the individual and at the city level, respectively (Næss, 2015 and 2016).

differences in travel behavior between urban residents living at different residential locations is residential self-selection based on attitudes about transportation.

Although the interviews had an explanatory purpose, they also had an exploratory element, reflected in our encouraging the interviewees to talk freely around the overall theme of the study in the beginning of the conversation, and by our inclusion of additional research sub-questions in the interpretation scheme during the process of interpreting.

One could object that many of the mechanisms that we found through the interviews and the interpretation process are in line with assumptions already widely held among transportation geography researchers. However, these mechanisms have often just been assumed without empirical demonstration of their actual existence or how they play out under particular contextual conditions. Moreover, certain mechanisms often claimed to be very important were not encountered in the interviews, while some other mechanisms often ignored in the literature were demonstrated to be quite important. An example of the former is the belief that the street pattern in the local neighborhood is among the key built environment characteristics influencing residents' overall amount of car driving (Ewing & Cervero, 2010; Stevens, 2017). However, none of the participants of our qualitative interviews indicated that the local street pattern was important to their travel – this feature of the built environment was barely mentioned at all. An example of a mechanism often ignored in the literature, which the interview material identified as quite important, is the strong roles of residential preference criteria other than travel attitudes when households decide where to live. The interviews thus showed several examples of interviewees who did prefer to go by transit or non-motorized modes if possible, but still opted for a suburban dwelling because this conformed with their lifecycle stage and other attitudes that they also held. Some were also unable for economic reasons to buy a dwelling as close to the city center as they had otherwise wanted. By showing the strength of other residential choice criteria than preference for particular travel modes, the study provided arguments against the frequently expressed claim (e.g. Bagley & Mokhtarian, 2002; Van Wee, 2009 and 2013) that residential self-selection based on travel attitudes represents a serious source of error in studies of influences of built environment characteristics on travel behavior.

The knowledge drawn from the interviews is of course fallible (as is the knowledge drawn from the quantitative parts of the study. For one thing, interviewees' accounts are both limited and corrigible due to the existence of unacknowledged conditions, unintended consequences, tacit skills and unconscious motivations (Bhaskar, 1998). Different possible interpretations exist about what an interview material is about, and any meaning pulled out of interviews is in principle contestable (Alvesson, 2011:5). The interpretation is a construction of reality, not reality itself. And in this contest, the reality constructed is the interviewees' narratives about their rationales, practices etc. of relevance to our research questions, and not the reality that these narratives purport to depict. An interviewee's narrative may be inaccurate or biased for many reasons, such as a wish to present oneself in a favorable light, oblivion about hidden structural conditions, inability to articulate precisely how one feels about and experiences the topics talked about in the interview, or simply misunderstandings. Interviewees may also have different opinions than researchers about what is important or unimportant in a situation and may leave out details that from a theoretical perspective could be important. The account of reality that we as researchers produce through our interview interpretation (for example, about the underlying rationales determining why an interviewee has chosen a facility at a particular location as the place to carry out a certain activity) is (at least) triply indirect. The reality that we try to uncover is filtered through the way

the interviewee perceives it, the way she or he speaks about it during the interview, and the way we researchers interpret what is being said in the interview.

I acknowledge these limitations and also that the interpretations, as well as the conduction of the interviews (e.g. when posing probing follow-up questions) is theory-laden. Nevertheless, although the knowledge drawn from interviews is necessarily fallible, I maintain that the interviews provide a better base for drawing conclusions about our research topic than what would have been the case in the absence of doing the interviews. This is especially so because the qualitative interviews were not conducted as the only research method, but in combination with a questionnaire survey forming the base for cross-sectional as well as longitudinal analyses. The narratives of the interviewees (who were also survey respondents) could thus be judged not only against what might logically or theoretically seem plausible, but also against other empirical evidence from the same geographical context and time. On the other hand, one important interpretation strategy was only followed by one of the interviewers (including eight of the 33 interviews), namely the writing of fieldnotes summarizing the main impressions immediately after each interview. This should be done as a standard procedure when practicing our methodology in future projects. As mentioned earlier, this would require that sufficient time be set aside each day of interviewing for writing such fieldnotes.

The way we conducted the qualitative research in this study required a very extensive amount of work, since two persons participated in each interview, each interview was interpreted by two persons, and a second person commented on each synthesis produced by the main responsible person. Having two persons involved in each of these stages provided intersubjectivity and thus increased the reliability of the study. It also happened quite often that one interpreter saw things that the other interpreter had overlooked. Altogether, the interviewing and interpretation took nearly 2500 hours⁴.

As argued throughout this paper, qualitative studies are necessary in order to get insights into the detailed mechanisms by which the built environment can influence travel behavior. Explanatory qualitative interviewing is relevant for many fields of study that are now relying solely on quantitative methods, not as a replacement, but as a supplement to the quantitative approach. The method appears particularly relevant for studies investigating the impacts of various (immaterial as well as material) social structures on people's dispositions and behavior.

However, now that several of the basic mechanisms through which residential location influences travel behavior have been demonstrated in qualitative interviews, each and every new study does not necessarily need to do all this. Based on the insights into causal mechanisms established in this study, several new quantitative studies could be carried out over the next years in cultural-political-economic contexts not differing too much from that in Greater Oslo and Greater Stavanger without necessarily having to conduct new qualitative interviews, as long as such studies are informed by the qualitative insights gained in this and other qualitative studies. However, since each research study of residential location and travel takes place in a specific spatiotemporal context, such incorporation of knowledge derived through different research methods could still be expected to be more successful in studies

⁴ About one third of a project budget of NOK 5 million (approx. 535,000 Euro) was spent on interviewing and interpretation. Was it worth it? In my opinion, yes. Several research projects spend 180,000 Euro getting less out of it (in terms of research quality but also measured in terms of publications, cf. above) than we did from the qualitative part of this project

combining quantitative and qualitative methods. The researcher can then also benefit from first-hand evidence from both kinds of sources.

The Oslo and Stavanger study encompassed the impacts of residential location on a broad range of interrelated aspects of human behavior: activity participation, travel, physical exercise and to some extent also health and neighborhood contacts, still with the main emphasis on the transportation topic. This broad scope has necessarily been at the cost of going more deeply into each separate sub-topic addressed in the interviews. In some future studies of residential location and travel, it could be relevant to focus more narrowly on one theme at a time in order to go more deeply into that theme (for example attitude-based residential self-selection). This would on the other hand remove some of the broad contextuality that is an important strength of the present study. Replacing the broader scope with narrower (and perhaps more discipline-specific) focus should therefore not be recommended as a general strategy.

4. Concluding remarks

Using a study of influences of built environment characteristics on travel as an example, this paper has shown how explanatory interviewing and interview interpretation can be done within a mixed-methods framework. A key tool in this and our preceding studies was an interpretation scheme developed for explanatory qualitative interview research. The interpretation scheme requested us, as researchers, to write down what we could infer from each interview as answers to each one among a number of sub-question derived from the main research questions of the study. The scheme at the same time allowed for flexibility, as more sub-questions could be added if new aspects relevant to the topic were discovered during the interviews..

Distinct from methods such as ‘meaning categorization’, ‘meaning condensation’ (Kvale, 1996) or the counting of how frequently specific words and concepts appear or are combined within a text, our analysis of the interview material was based on holistic interpretation of the narratives of the interviewees. Given this overall holistic approach, the interpretation scheme helped keeping our focus on the research questions and forced us to make efforts to try to understand what the information given by the interviewees meant to each of the research questions that we tried to address (yet with an open view to possible new and explorative elements). Particularly for the analytical parts of the scheme, our interpretation combined the statements of the interviewees with theoretical perspectives and information from the questionnaire part of the study. We thus utilized the benefits of a theory-informed mixed-methods study, reflecting our critical realist approach.

While obviously not being the only way to conduct explanatory qualitative interview research, our experience is that this method has proven fruitful in a number of studies on built environment and travel over the last fifteen years. Explanatory qualitative interviewing is relevant for many fields of study that are now relying solely on quantitative methods, not as a replacement, but as a supplement to the quantitative approach. This does not mean that each study should necessarily combine a qualitative and a quantitative part. Some could be only quantitative and some only qualitative, but the two kinds of studies should be informing each other. And doing both a quantitative and a qualitative part within the context of the same study, focusing on the same geographical areas, is a clear advantage. The explanatory qualitative interviewing method appears particularly relevant for studies investigating the

impacts of various (immaterial as well as material) social structures on people's dispositions and behavior.

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Appendix 1: Research sub-questions included in the interpretation scheme⁵

1. In which intra-metropolitan "bounded" activities does the interviewee participate on weekdays and, if relevant, in the weekend?
2. In which intra-metropolitan "partially bounded" activities does the interviewee participate on weekdays and, if relevant, in the weekend?
3. In which intra-metropolitan "non-bounded" activities does the interviewee participate on weekdays and, if relevant, in the weekend?
4. In which extra-metropolitan activities does the interviewee participate?
5. How important has the distance from the dwelling been for the interviewee's choices of workplace/place of education, kindergarten/crèche, shops and leisure facilities?
6. Which daily-life activities does the interviewee travel out of the local area to reach?
7. Which more sporadic intra-metropolitan activities does the interviewee travel out of the local area to reach?
8. Which daily-life activities does the interviewees carry out within the local area?
9. Which, if any, of the intra-metropolitan "bounded trips" have destinations within a short distance from the dwelling?
10. Which, if any, of the intra-metropolitan "bounded trips" have destinations within a long distance from the dwelling? (occupational journeys not included)
11. Which, if any, of the intra-metropolitan "partially bounded trips" have destinations at a short distance from the dwelling?
12. Which, if any, of the intra-metropolitan "partially bounded trips" have destinations at a long distance from the dwelling?
13. Which, if any, of the intra-metropolitan "non-bounded trips" have destinations within a short distance from the dwelling?
14. Which, if any, of the intra-metropolitan "non-bounded trips" have destinations at a long distance from the dwelling?
15. Do any of the acquaintances of the interviewee live in the local area?
16. Is there much contact and common activities among the neighbors in the residential area?
17. Which means of transport are used for the different travel purposes in everyday life?
18. Do the travel modes of the interviewee deviate for ideological or attitudinal reasons from what is usual in their local neighborhood and in the metropolitan area as a whole?
19. Which, if any, activities does the interviewee carry out in the downtown area?
20. Does the interviewee consider that the downtown area has any particular "atmosphere" making it attractive beyond its mere concentration of facilities? Does the interviewee consider other parts of the metropolitan area to have any such "atmospheric" qualities?
21. Does the interviewee emphasize accessibility/reduced needs for transport as an important feature of the residential area and/or reason for living in this residential area?
22. Does the urban structural situation of the dwelling put any constraints on the interviewee's outdoor life/use of recreational areas?
23. Does the urban structural situation of the dwelling put any constraints on the interviewee's participation in physical exercise? Does the interviewee consider that there are any features of the dwelling and its neighborhood that are unfavorable from a health perspective?
24. Has the interviewee taken up any new activities or dropped previous activities as a result of having moved from one residential location to another?
25. Has the interviewees changed her/his travel behavior as a result of having moved from one residential location to another?

⁵ In cases where the information given in the interview provided a basis for it, the questions were answered taking the whole household of the interviewee into consideration and not only the individual interviewee.

26. Has the interviewee changed her/his car ownership (or ownership of other motor vehicles) as a result of having moved from one residential location to another?
27. Does the interviewees consider that he/she would have had a different activity pattern and travel behavior if living in a different part of the metropolitan area? If so: what would have been different?
28. Does the layout of the road network and/or the availability of bike paths in the local neighborhood and/or along relevant corridors influence the interviewee's choices of travel modes and/or activity locations?
29. Which considerations influence the interviewee's choices of travel routes when traveling within the metropolitan area?
30. Does the quality of public transport connections (walking distances, frequency of departures, necessity of changing between different lines, etc.) have any influence on the interviewee's choices of travel modes and/or trip destinations?
31. Which considerations influence the interviewee's choices of travel modes when traveling within the metropolitan area?
32. Would the interviewee (if presently having a car available for use) have to change her/his activity pattern significantly if she/he had no longer access to a private car?
33. Are there indications of "compensatory" leisure travel?
34. Does the interviewee for cultural or lifestyle reasons prefer to visit certain districts within the metropolitan area frequently (or avoid certain areas)? In case, which areas?
35. Are there any other places within the metropolitan area (i.e. other than the existing place of residence) where the interviewee would like to live, or places where she/he would not at all like to live?
36. Is the interviewee interested in and/or involved in the spatial planning and development of Oslo (alternatively Stavanger) Metropolitan Area?
37. Are there any indications of residential self-selection based on travel behavior attitudes?
38. Other important issues raised in the interview not covered by the above questions?
39. Which overall life-forms, lifestyles and rationales are influencing the interviewee's participation in out-of-home activities?
40. On which rationales does the interviewee base her/his choices of activity locations?
41. On which rationales does the interviewee base her/his choices of travel modes?
42. On which rationales does the interviewee base her/his choices of routes followed?
43. Which among competing rationales seem to be the strongest ones for the interviewee's choices of activity locations?
44. Which among competing rationales seem to be the strongest ones for the interviewee's choices of travel modes?
45. Which among competing rationales seem to be the strongest ones for the interviewee's choices of routes followed?

Appendix 2: Question groups

The 12 question groups of the synthesizing analyses across the individual interviews are shown below in alphabetical order, together with the questions of the interpretation scheme included in each question group.

Activities	1, 2, 3, 4
Activity location rationales	5, 40, 43
Attitude-based residential self-selection	21, 37 and partly 5
Changed patterns after moving	24, 25, 26, 27, 32
Compensatory travel	33
Distances to activities	6, 7, 8, 9, 10, 11, 12, 13, 14
Lifeways and lifestyles	18, 39
Neighborhood contacts	15, 16
Other important issues	38
Outdoor life, exercise, health	22, 23
Spatial planning interest	36
Travel mode rationales	17, 30, 31, 41, 44
Travel route rationales	28, 29, 42, 45
Urban atmospheres etc.	19, 20, 34, 35

Appendix 3: An excerpt of the 45-pages synthesizing interpretation of the question group: Activity location rationales

Excerpt (361 of 12680 words) of final synthesis for the question group “Activity location rationales”	Interviewees (only one shown here)	Question	Interpretation
<p>among some of the Stavanger interviewees. The aspects mentioned are that the job should meet the interviewee’s professional interests and educational qualifications (32356, 52803, 41053). This indicates an emphasis on self-realization. This sub-rationale is probably also relevant to many other interviewees, although it is usually not stated explicitly in the interviews, probably because the interviewees take this for granted. For 41053, who has not yet managed to get any job matching her education, finding such a job cannot be taken for granted, and this aspect is thus reflected on and articulated explicitly in a way differing from most other interviewees. Salary or working conditions are not mentioned by any of the interviewees. The Oslo metropolitan area interviews do not give information making it possible to identify what aspects of job quality are most important (e.g. job content vs. salary. For outdoor recreation, experiencing nature and having opportunities for mental relaxation/restoration are important, in addition to the practical possibilities for performing particular outdoor recreation activities (dog-walking, hiking, cross-country skiing, alpine skiing, jogging, diving and mushroom picking were mentioned) are criteria indicating that outdoor recreation will be located to different area types, depending on the desired kind of outdoor recreation. For special commodity shopping, parking conditions and the general atmosphere were also mentioned (see below).</p> <p>Apart from the instrumental suitability of the facility for the activity in question, the interviews show examples of the following sub-rationales under the rationale of choosing the best facility: Cultural/symbolic preference (37424, 17833 and 10749), landscape esthetics (33352 and 53940) and atmosphere (40363). 37424’s cultural taste for (mainly) classical music influences his choice of leisure activity facilities, whereas interest for folk music and folk dancing influences 17833’s location of the cultural events that she attends. Cultural taste also influences what kinds of restaurants (10749) and urban atmospheres the interviewees appreciate. Landscape esthetics seem to be an important underlying criterion underlying the preference of 53940 for locating his weekend outdoor recreation activities to large and continuous natural areas. For daily necessities shopping, the quality aspects mentioned by interviewees are assortment and kindness of staff (54466), where the former is a clearly instrumental aspect while the latter implies affective preference.</p>	<p>16030, non-central western Oslo suburb. M41 + wife and 3 children (M3, M3, F5)</p>	<p>5. How important has the distance from the dwelling been for the interviewees’ choices of workplaces/ places of education, kindergartens/ crèches, shops and leisure facilities?</p>	<p>There is a sort of maximum acceptable distance for commuting, based on travel time, but within this threshold other criteria are more important for which job to apply for. Kindergartens and schools are much of the same quality, so the closest one or the one with the most convenient access (e.g. because it is located on the route from home to work) is chosen. For grocery shopping, the range of the assortment is more important than distance minimizing, resulting in a preference for a large store (REMA Lommedalen) 5 km from home rather than one of the smaller shops closer to home. This could be due to the dominance of the car as his main mode of transport. They also most often go to Sandvika Storsenter when buying special commodities like books or clothes, although closer opportunities exist and they find the Storsenter very charmless. Again, the wide assortment trumps proximity (and in this case also atmosphere). The interviewee does not normally use the many shopping opportunities near the workplace. This is mainly because he wants to get quickly home from work in the afternoon.</p>
		<p>40. On which rationales do the interviewees base their choices of activity locations?</p>	<p>The interviewee accepts a rather long commute in order to have a suitable job, but there is a maximum distance somewhere, determined by travel time and convenience (in terms of congestion) rather than physical distance. The interviewee points at Alnabru as the easternmost acceptable workplace location but says he would not mind having to commute to Drammen because the journey there is less congested.</p> <p>The interviewee works on his computer at home nearly every evening but does not regularly use the possibility of working at home as an opportunity for not traveling to the workplace. Working at home is instead utilized as a way to avoid too long afternoons at the workplace.</p> <p>For daily necessities shopping, the ‘best facility’ is chosen, i.e. a well-assorted shop where you can get everything you need instead of having to go to several smaller shops. This well-assorted store is still not located very far away from home (5 km), but still further away than some other, less well-assorted shops used only for occasional supplementary purchases.</p> <p>The kindergarten of the children was chosen because they can drive past it on the way to the job, whereas another kindergarten located slightly closer to home would require that they walked down to it and back before setting out for their journey to work. In addition, their present kindergarten was recommended in order to have a better mix of children when beginning in primary school. The children will go to the closest school, which can be accessed in a safe way by foot. There is no perceived quality difference between the four different schools in the area, so they opt for the closest one.</p>
		<p>43. Which among competing rationales seem to be the strongest one for the interviewees’ choices of activity locations?</p>	<p>Activity location: Workplace: Best facility within a quite wide travel time limit (45-60 minutes) Shopping: Best facility within a shorter travel time limit Outdoor recreation: Concerns of best facility and proximity can to a large extent be combined</p>

