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Residential Location Choices of an Isolated Work Force

Shifts in Social Attachment of Former Seafarers

C. D. Isakson · Michael S. Dahl · Toke Reichstein

Abstract This paper investigates whether seafarers who work in nomadic isolated work settings, exhibit a different behaviour in terms of residential location choices and hence social attachment/detachment. An empirical analysis of a sample of seafarers and matched traditional workers suggests that individuals working as a seafarer rely on family-based social relations to a lesser extent than traditional workers when making residential location choices. Such workers chose to locate close to their former peers, suggesting a shift in social attachments. The isolated lifestyles of the seafarer influence social attachment. Geographic distances and social contexts are shown to interact and affect one of the most important decisions that individuals make. This is implications for our understanding of the health of seafarers and may offer new aspects on the recent development of the work conditions of seafarers.

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1 Introduction

Working in the maritime industry as a seafarer is demanding in numerous ways. One of the more challenging aspects of the job is the time spent away from home. For example, seafarers often travel to and from their vessels and are typically away from home for days, weeks, months, or in some cases, years at a time while keeping a 'home base'—familial and social attachments—on land. Consider then, that the nature of seafarers' work satisfies the definition of employment-related geographic mobility, that is, '...frequent and/or extended travel from places of permanent residence for the purpose of, and as a part of, employment" (Cresswell et al., 2016, p. 1788). In addition, Cresswell et al. (2016) consider employment-related geographic mobility (E-RGM) a spectrum. Specifically, they define the temporal characteristics of the E-RGM spectrum as including workers who do at least two hours' commuting for a single day's work, to those traveling and working away from home for up to a couple of years in one stretch. The temporal characteristics of a mariner's work at sea fits comfortably within this E-RGM spectrum.

Another one of the more challenging aspects of the job is being isolated from key social relations, specifically the individual's closest family, for lengthy periods. Indeed, rapid technological advancement, increased automation, decreased personnel, more diverse crew, lack of shore leave, faster turnaround schedules and hierarchical command systems all contribute to an increased social isolation onboard the vessels as well (ITF Seafarers Trust, 2017). These work conditions may also lead to health issues. It has already been revealed that seafarers in particular are at risk of suffering from stress (Lipowski et al., 2014; Sliskovic and Penezic, 2017; McVeigh et al., 2019) and fatigue (Wadsworth et al., 2008) in the workplace. Furthermore, seafarers report that their seafaring partners' work, which requires extended periods away from the family, often results in additional negative effects on their relationships at home (Sliskovic and Juranko, 2019). Investigating the social attachments of maritime workers may offer new insights as to some of the circumstances that lead to feelings of isolation and ultimately elevated stress levels. One way to investigate isolation effects on social attachment is to probe into residential location choices of the maritime workers.

Research has provided extensive insights into the factors that influence an individual's choice of residential location; these factors include economic forces (Rosen, 1974), flight from blight (Bayoh et al., 2006), amenities in the local area (Krupka, 2009) and market opportunities (Clark and Cosgrove, 1991). Recent studies have emphasised the importance of proximity to family and friends in an individual's choice of residential location (Dahl and Sorenson, 2009, 2010a,b). These studies suggest that family and friends play a more important role than economic incentives with respect to residential location choice. However, they rely exclusively on data on the migration of workers who are employed in traditional settings in which their work related mobility almost exclusively is between their home and a fixed location of work. Traditional data such as this make it difficult to account for influence outside the

workplace. Furthermore, such settings do not consider the possibility that specific work conditions may alter even the strongest social ties (i.e., family) and hence change a worker's residential location choice. Maritime workers who are characterised as being isolated may display different social relation networks than those for whom the choice of residential location shifts from the traditional family pattern to alternatives. Therefore, prior studies did not consider the role of contextual settings in shaping the covariation between social relations and residential location choices and lend little insight on the social attachment/detachment of maritime workers.

Prior work has shown that extended separation from attachment figures may cause disruptions in social relations Vormbrock (1993) by breaking day-to-day interactions, and suggest the emergence of negative emotions associated with such detachments. Consequently, even the strongest social relations with the individual's immediate family may break down. Choices on regional settings for living are hence likely to shift from one referential group to another if these social relations are altered due to extreme work contexts such as those present among seafarers.

Research has found it difficult to provide relatively strong and robust estimates of how separation may cause social detachment and shifts in behaviour. A clear and precise form of separation needs to be identified, and a substantial measure of behavioural shift and the shift in the social attachment from one clearly identified group to another has to be established. The maritime setting is a golden opportunity to investigate how individuals' residential location choices are associated with their exposure to co-worker peers in isolated work settings, thereby not only contributing to our understanding of work conditions of maritime workers but also contributing to the research on social attachment/detachment. We can determine how the work settings of seafarers may redefine an individual's social relations by comparing the choices of individuals in such settings with commensurate individuals working in more traditional settings; this comparison would provide traction in our aim to understand the association between separation, shifts in social relations and behaviour. In this paper, we specifically draw on family studies for defining social relations as the individual's immediate family, specifically parents and siblings.

Since residential location choice is, to a large degree, an economic choice, the design of this study also allows us to provide insight into an important question: To what extent can an economic action be linked to the social relations of individuals (Granovetter, 2005)? Understanding the magnitude and strength of this relation is important since economic choices are made continuously and social relations often influence the quality of an individual's life. Learning how social relations impact residential location choices could profoundly contribute to our understanding of individuals' economic choices, as well as to how social relations may change over time. This research also provides insights into recent studies examining the connection between family ties, geographic mobility and employment (Hofmann, 2015) and those examining the relationship between neighbourhood mobility and social relations, specif-

ically, social ties (Knies, 2013). While this study investigated how different types of neighbourhood mobility influenced social ties, it is equally important to determine how social ties influence neighbourhood mobility.

This paper considers nomadic and isolated workers and specifically seafarers to be representative of individuals exposed to isolated work settings. Seafarers are detached from normal living arrangements for a long period that creates a geographical segregation from conventional linkages and ties, which are replaced by new social relations. This paper investigates whether this shift in social attachments reshapes an individual's residential location choices. The arguments in this study are based on the idea that seafarers detach from their traditional and family-based relations and form new ties within their work context. Social detachment and social attachment are the basis for the investigation. In principle, we offer an investigation that links separation, shifts in social relations and behaviour.

We investigate the social attachment of seafarers by investigating seafarers' residential location choices in terms of distance to immediate social relations. Specifically, we investigate whether seafarers, who work in nomadic, isolated settings, have a tendency to detach themselves from traditional and family-based social relations, measured through residential choice. Residential location choice is one of the most important and consequential decisions that an individual makes. It has immense implications for a person's quality of life, and it often involves a substantial investment. The choice of residential location also has an impact on the emergence and durability of an individual's social relations, which are often geographically bound (Sorenson, 2003). This decision will not only shape an individual's current social interactions, but will also ultimately shape future social interactions. Examining the circumstances under which individuals make a choice of residential location is a suitable way to understand the association between employment-related geographic mobility, the isolated work setting and social detachment/attachment. The paper specifically investigates whether seafarers are less inclined than workers in more typical work settings to choose to locate close to their parents, siblings and other traditional social relations and whether they were more inclined to choose to locate close to their former peers. Seafarers' occupational settings are characterised by isolation and remoteness over long periods without any fixed geographical location. Their work setting dictates a rather withdrawn professional environment that is typified by a high level of solitude in which they socially interact with a small number of peers with whom they share a similar perspective.

2 Theoretical Framework

2.1 Social Detachment

Work conditions of seafarers may be best be described as nomadic. Previous research on labour mobility describes the nomadic worker—like seafarers—as

itinerant and uncommitted to an organisation. Recent research refutes this putative negative relationship (Pittinsky and Shih, 2004). However, further investigation into the changes in social attachments of a worker when he or she increasingly spends time away from home may offer more insights on this equation. A seafarer's place of employment is often geographically separated from his or her place of residence. In fact, for many individuals, their place of work is far from the place they call home. For some workers, such as journalists, military contractors, long-haul airline workers, truck drivers and many types of consultants and diplomats, the workplace may even be in constant motion. Seafaring is one of the extreme cases of such work conditions.

The extensive time that such mobile workers spend away from their physical homes also causes them to spend time away from their traditional attachment figures, such as family and friends. Early psychological studies examined attachment by investigating the effects of physically separating children from their attachment figures, such as their mothers. These studies indicated that the children exhibited several distinct stages of detachment (Robertson and Bowlby, 1952; Bowlby, 1960).

Physical separation is the principle concept in Bowlby's (Bowlby, 1969, 1973, 1980) attachment theory. Bowlby contended that physical separation triggered emotional and physical reactions that were ultimately indicative of detachment. After Bowlby's study, a stream of literature emerged that applied attachment theory to adults. In a comprehensive review of this literature, Vormbrock (1993) reported that extended separation from an attachment figure resulted in various forms of emotional disruption. Attachment figures can provide a means of modulating emotions, can influence emotional control and can affect day-to-day behaviour (Kobak and Sceery, 1988; Feeney, 1995). This suggests that a person's proximity to an attachment figure provides comforting emotional benefits. Moreover, when a spouse travels away from home for work, negative emotional reactions are produced that are consistent with the reactions predicted by the attachment theory (Diamond et al., 2008). Physical distance between individuals triggers mechanisms of social detachment because it removes a person's sense of having a secure base and it hinders the day-to-day expression of affection. In this context, the shared experience between individuals tends to be limited. This creates social separation that may lead to social detachment.

Often, isolated workers have jobs in remote locations where communication outside the workplace is virtually impossible for days, weeks or even months at a time. Under these circumstances, it is difficult for individuals to maintain close, frequent contact with family and friends. This lack of contact may increase the negative emotions that are associated with detachment and decrease the emotional benefits that are associated with day-to-day contact (Diamond et al., 2008; Sliskovic and Juranko, 2019).

For these reasons, the isolated work settings of seafarers may cause a decline in attachment to social relations that are defined by traditional and family-based ties. Long periods away from home may render close communication impossible, which could, in turn, cause a decline in the level of contact

and a decrease in the strength of family bonds. Consequently, it is likely that individuals working in more traditional settings may consider their social attachments to a greater extent when making residential location choices that could affect or influence these social ties. Seafarers, who engage in nomadic and isolated labour, may have experienced social detachment and, thus, give less priority to families and traditional social relations when making residential location choices. For these reasons, we hypothesise that:

H1: *Seafarers who have been working in isolated work settings rely to a lesser extent on family and traditional social relations when making residential location choices than individuals coming from more traditional work settings.*

2.2 Social Attachment

A seafarer who detaches from family and traditional social relations may form other types of social attachments. They turn to other social contacts to build social relations. It is well known that social relations are ultimately dictated by homophily (McPherson et al., 2001). Similarity between individuals is almost a prerequisite for social connections. Not only are we more likely to form ties with people who are like us, but links with people who are dissimilar also tend to dissolve more quickly. These effects tend to render networks rather homogeneous. Our strongest and most profound network ties thereby tend to build on and be characterised by homophily. Homophily is defined by numerous characteristics, such as education (Marsden, 1987) and occupation (Verbrugge, 1977), which includes a communality in the work environment. Indeed, educational background creates a segregation of individuals in which each group is limited in professional opportunities. However, it may not only be in terms of occupational work tasks. Similar individuals are inclined to work at the same organisations for two reasons. First, matching in the labour market is not a random process. An individual self-selects into an organisation that portrays a certain manner of conduct and presents a workplace environment that is compatible with his or her own disposition. Furthermore, organisations select employees who have professional and personal characteristics that fit with the workplace (Jovanovic, 1979; Ozcan and Reichstein, 2009). These selection mechanisms dictate a matching process that limits the diversity among peers in the workplace.

Second, homophily in the workplace may also occur through isomorphism, which is the social tendency that causes individuals to adopt practices displayed by their closest peers (Burt, 1982). The shared environments that exist in the context of isolated workplaces may lead to isomorphisms, which is often referred to as a socialisation process (Kandel, 1978). Workplace peers become a salient social influence and shared processes become more articulated as peers work closely together and interact with one another (Nanda and Sørensen, 2010).

When the workplace is characterised by high levels of homophily, there are also high levels of social interaction among peers. Indeed, working in groups with equal-minded peers who share similar values and beliefs may lead to more frequent and successful exchanges with others. In addition, research shows that social relations are more likely to arise in shared geographical locations (Cambell, 1990) and in homogeneous work settings (McPherson and Smith-Lovin, 1987). The mechanisms of homophily and the tendency for individuals, when among peers, to adopt more shared values and practices can create strong social relations. This is particularly true among peers in isolated workplaces in which the workers spend extended periods of time together and continuously interact, often in a geographically proximate and remote place—such as when seafarers are at sea. Such relations among peers may at least partially compensate for some of the social detachment that they experience with regard to family-based or traditional ties. The seafarers' work environment thus becomes a hotbed for the formation of strong homophilic social relations and can, in turn, become instrumental in the formation of strong social attachments since frequent successful interactions may generate positive feelings and emotions that lead to more cohesive social relations (Lawler and Yoon, 1998). Furthermore, studies indicate that peers can significantly influence their colleagues at the workplace (Nanda and Sørensen, 2010; Perry and Porter, 1982). As such, it is reasonable to suggest that peers play an important role for the nomadic seafarer who is part of an isolated work force. Their peers become their obvious alternatives to family-based and traditional social relations.

Given these considerations, seafarers in an isolated work context may be more influenced by their peers with respect to their residential location choices when compared to other individuals in more traditional workplace settings. When seafarers make their residential location choices, there may be a tendency to turn away from connecting to family and past social relations and to connect, instead, to work-based relations. The extensive contact and close friendship that emerges in the nomadic setting could lead peers to take the place of families as a basis for social attachment. This leads us to the second hypothesis:

H2: *Seafarers who work in isolated and nomadic work settings consider work peers to a greater extent when making residential location choices than individuals working in more traditional work settings.*

3 Data and Method

To investigate the proposed hypotheses, we relied on a combination of register data. First, we used the Mariners Database, provided by the Danish Maritime Authorities, containing data on all individuals working onboard Danish commercial vessels between 1997 and 2005 in terms of job position, vessel type and periods of working onboard a given vessel. This was used to track the durations of being at sea of each maritime worker. We specifically extracted from

this database former seafarers who had worked at least two years as seafarers and then chosen to go ashore for at least one year.

The second register we drew on is the Danish Database for Labour Market Research (IDA), collected and maintained by Statistics Denmark. This database contains data on social relations, among other things, marital status, family status, home and work location, education and employment history. It allows the researcher to track family linkages and has been used extensively in research pertaining to the labour market.

The combination of these two datasets allows us not only to track the seafarers but also to create a match sample of non-seafarers that will act as our counter-factuals for investigating whether the seafarers would have exhibited the same location choices had they not been seafarers. Please see the supplementary materials for a more comprehensive description of the data, the samples and the applied analytical choices.

4 Results

Table 1 reports the descriptive statistics with regard to explanatory variables. Four subsamples were considered based on the two dichotomous variables. First, we divided the sample according to whether the observation involved a former seafarer or part of the control sample. Second, we divided the observations according to whether it involved the chosen municipality or one of the 270 municipalities not chosen by the focal individual.

By comparing the descriptive statistics of the former seafarers and the chosen municipality to the corresponding statistics of the control sample and the chosen municipality, we see a tendency for log(distance to home), log(distance to prior residence), and log(distance to parents) to be higher for former seafarers than for the control sample. This is a first indication that former seafarers move farther away from their social relations than did members of the control group, which suggested that social detachment mechanisms even may have been operating when the individuals were working in isolated settings. However, these descriptive statistics also suggested that former seafarers move to a municipality closer to the residential location where their siblings were living than the control sample subjects. This challenges the theoretical arguments of the paper. The conditional logit will reveal whether this feature is simply an artificial bi-product caused by spurious correlations.

When the observations of former seafarers involving the chosen municipality were compared with the observations involving the not-chosen municipality, the descriptive statistics indicated that there was a tendency for the former seafarers to relocate closer to their former peers when they moved. The average distance in kilometres to their former peers seemed to be lower for the chosen municipality subsample than for the not-chosen subsample of former seafarers. These descriptive statistics provided weak indications that some shift in social relations had taken place, which, in turn, caused a change

Table 1 Descriptive statistics considering the overall observation which was the overall for the chosen residential location

Variable	Former seafarers Sample Mean	SD	Control Sample Mean	SD
Chosen Municipality				
Regions attractiveness to former seafarers	0.059	0.079	0.018	0.047
Regions attractiveness in general)	0.019	0.020	0.009	0.012
Home city	0.534	0.499	0.528	0.500
log(Distance to home)	1.676	1.844	1.340	1.466
log(City size)	10.186	1.534	9.487	1.087
log(Distance to prior residence)	2.780	1.000	1.381	1.035
log(Distance to parents)	2.310	1.940	1.330	1.718
log(Distance to siblings)	1.879	1.922	2.290	1.487
log(Distance to past seafarer peers)	3.768	0.710	n.a.	n.a.
Not Chosen Municipality				
Regions attractiveness to former seafarers	0.003	0.013	0.004	0.014
Regions attractiveness in general	0.004	0.005	0.004	0.005
Home city	0.004	0.064	0.004	0.060
log(Distance to home)	4.158	0.723	4.177	0.751
log(City size)	8.721	0.806	8.723	0.813
log(Distance to prior residence)	4.175	0.589	3.076	1.917
log(Distance to parents)	3.000	1.993	2.383	2.136
log(Distance to siblings)	2.478	2.109	3.437	1.685
log(Distance to past seafarer peers)	4.128	0.632	n.a.	n.a.
Individuals	1,171		1,171	
Municipality (options)	271		271	
Observations	317,341		317,341	

in the residential location choices of former seafarers who has experience from an isolated, E-RGM work setting.

Turning again to the not-chosen municipality observations, when the descriptive statistics between the former seafarers and the control sample were considered, we found that log(distance to prior residence) and log(distance to parents) were greater for the former seafarers than for the control sample. Of those regions not chosen, the distance to siblings was less for former seafarers than for members of the control group.

Table 2 presents the Pearson correlation coefficients between the variables under consideration for the entire sample of observations used in the regression analysis. In general, the coefficients indicated what might be expected with regard to the signs, providing some evidence for the validity of the data. None of the coefficients caused any concern regarding potential bias due to multicollinearity in the regression. This conclusion was supported by low variance inflation factors.

Table 2 Pearsson Correlation Coefficients (N=634,682)

	Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
[1]	Residential location choice variable								
[2]	Regions attractiveness to former seafarers	0.148							
[3]	Regions attractiveness in general	0.118	0.750						
[4]	*Home city*	0.420	0.200	0.170					
[5]	log(Distance to home)	-0.212	-0.078	-0.109	-0.301				
[6]	log(City size)	0.083	0.462	0.822	0.114	-0.117			
[7]	log(Distance to prior residence)	-0.062	-0.024	-0.034	-0.092	0.300	-0.035		
[8]	log(Distance to parents)	-0.025	-0.005	-0.011	-0.041	0.123	-0.013	0.100	
[9]	log(Distance to siblings)	-0.030	-0.020	-0.030	-0.043	0.180	-0.032	-0.133	0.113

Table 3 Conditional Logit Regressions on the Residential Location Choice of Former Seafarers

	Former seafarers Sample			Control Sample	Combined Sample
	(1)	(2)	(3)	(4)	(5)
Regions attractiveness to former seafarers	19.792***	19.549***	19.263***	12.786***	17.335***
	(1.68)	(1.67)	(1.68)	(2.54)	(1.40)
Regions attractiveness in general	-88.954***	-88.154***	-87.442***	-95.878***	-92.458***
	(11.15)	(11.11)	(11.11)	(15.42)	(8.93)
Home city	0.857***	0.874***	0.903***	-1.228***	1.465***
	(0.16)	(0.16)	(0.16)	(0.15)	(0.15)
log(Distance to home)	-0.955***	-0.996***	-0.993***	-1.102***	-1.155***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
log(city size)	1.110***	1.118***	1.104***	0.798***	0.629***
	(0.09)	(0.09)	(0.09)	(0.10)	(0.07)
log(Distance to prior residences)	-0.184***	0.061	0.099	-6.191***	-6.076***
	(0.06)	(0.07)	(0.07)	(0.24)	(0.24)
log(Distance to parents)		-0.212***	-0.211***	-0.430***	-0.426***
		(0.05)	(0.05)	(0.05)	(0.05)
log(Distance to siblings)		-0.197***	-0.196***	-0.114*	0.026
		(0.05)	(0.05)	(0.06)	(0.06)
log(Distance to past peers)			-0.282***		
			(0.12)		
Seafarer × Home city					2.434***
					(0.21)
Seafarer × log(Distance to home)					0.154***
					(0.21)
Seafarer × log(city size)					0.596***
					(0.05)
Seafarer × log(Distance to prior residences)					6.150***
					(0.25)
Seafarer × log(Distance to parents)					0.263***
					(0.07)
Seafarer × log(Distance to siblings)					-0.249**
					(0.07)
Labor market region dummies (79)	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.51	0.51	0.51	0.69	0.59
Observations	317,341	317,341	317,341	317,341	634,682

Note: Standard errors in parentheses
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3 presents the results of the conditional logit regression against residential location choice. The table is divided into three parts. The first three columns provide a stepwise introduction of the explanatory variables involving only the former seafarers. Column 4 is based on the control sample observations. Column 5 involves the combined sample of both former seafarers and the control sample. This regression also includes the interactions between the explanatory variables and the dummy variables, which indicates whether the observation is a former seafarer observation (1) or a control sample observation (0). Because the conditional logit method exploits the variation among variables within the subject by controlling for subject-fixed effects, the regression analysis automatically excludes the former seafarer dummy. Finally, it should be mentioned that the log(distance to past peers) is calculated for the former seafarer observations only and is therefore present only in the regression results relating exclusively to former seafarers.

Focusing on columns 1–3, the results suggest that the former seafarers chose residential locations close to their home municipality, their parents and their siblings, all of which are significant at a 1% level. The results also indicate that the former seafarers choose the municipalities of their home city and to locate in more urban sites as expressed by the city-size variable. These estimates are also significant at a 1% level. This last effect may, however, only reflect the general tendency for individuals to agglomerate in city regions. The findings are consistent throughout the stepwise introduction of the variables. These results also follow all our expectations regarding individuals who were not in isolated work settings. For these reasons, similar patterns can be observed when considering the results of the control group subjects as displayed in column 4. Here it should be noted that the distance to prior residency is not significant for former seafarers. This may indicate that individuals exposed to isolated, E-RGM work settings such as those of seafarers become footloose and detached.

However, columns 3 (seafarers) and 4 (control sample) do seem to exhibit differences in estimates. The estimate relating to distance to home and the estimate relating to distance to prior residences is higher in absolute terms for the control sample than it is for the former seafarers. This may be a first indicator of seafarers becoming more socially detached, and that they, therefore, become less inclined to look to traditional and family-based social relations when choosing their residential location. Before making these conclusions, however, we should consider whether there are significant differences in the estimated coefficients found for the former seafarer sample and the control group sample.

Column 5 presents the observations for the entire sample and includes the interaction of the explanatory variables with the dummy variable for whether the observation involves a former seafarer. The interaction effect becomes a direct test of whether the estimated effect sizes between the two sub-samples are significantly different and the direction in which the two differ. These are hence the formal tests of the hypotheses. Column 5 shows all interaction terms to be significant at a 1% level, except the estimate on distance to siblings, which

is significant at a 5% level. Indeed, the results suggest that former seafarers chose a residential location that, on average, is farther from home, prior residences and parents. Overall, this supports H1, with the exception that former seafarers are significantly more likely to locate closer to their siblings than the control sample. Social connections from home regions, prior residences and parents' residences matter less for seafarers. Column 5 also provides support for the proposition that former seafarers are significantly more likely than members of the control group to locate in urban areas. Finally, we consider the degree to which the former seafarers display a greater likelihood of locating closer to their former peers. Column 3 contains a negative estimate associated with the log(distance to past peers) variable (1% level of significance). This indicates that the former seafarers choose a residential location that, on average, is relatively closer to the residential location where their former peers were living. This supports H2.

In terms of the control variables, Table 3 indicates that the regions that are attractive to the general public are deselected among seafarers, while those regions that are attractive to former seafarers are those to which our sample relocates. We consider this to be an indication of a satisfactory match since this holds for both seafarers and the control sample.

We also redirect the reader's attention to the supplementary analysis in the supplementary materials. Here we further consider the strength of the association by conducting groupwise investigations using the duration at sea to split subjects into groups. Here, the overall pattern suggests that those spending more time at sea separate themselves more from the more traditional family relations.

5 Discussion

In an aim to understand the social attachment/detachment of seafarers, this paper builds on literature on employment-related geographical mobility (Cresswell et al., 2016; Hofmann, 2015; Knies, 2013; Pittinsky and Shih, 2004), research on the 'dual life' context and the implications for loss of emotional benefits (Diamond et al., 2008; Sliskovic and Juranko, 2019), work on physical separation and attachment, as well as literature on the choice of residential location within a country. We studied the extent to which the residential location of family members influences the choice of a residential location for former seafarers. When choosing a residential location to live, compared with a matched sample of land-based workers, we found that former seafarers attached less importance to the residential location of their family, particularly the residential location of their parents. This is at the core of attachment theory (Bowlby, 1969; Vormbrock, 1993; Diamond et al., 2008).

Our second finding was that among seafarers, those who experienced more sea days or more stays at sea, and those who had been employed on deep-sea ships, were less likely to locate near their parents or siblings. We argue that this finding indicated that the lifestyle of seafarers at sea caused them to become

more socially detached from their families. Indeed, these findings support the literature on 'dual life' and how it hampers contact with family and friends and has implications on the benefits stemming from these interactions (Diamond et al., 2008; Sliskovic and Juranko, 2019).

Our findings add to the literature on the residential location choice of individuals within a country by emphasising the fact that certain types of individuals, particularly those who had been employed in jobs that involved time in an isolated workplace, give less priority to traditional social factors when choosing a residential location to live; social factors are the most critical factor for most other people when choosing residential locations. The fact that former seafarers appeared to substitute relationships with former workplace peers for family relationships suggested that the availability of frequent opportunities for face-to-face contact affected the extent to which these individuals valued social relations.

Perhaps more importantly, the paper adds to the literature on social attachment and the psychological effects of lifestyles and careers along the E-RGM spectrum. Indeed, it is plausible that the health-related issues associated with E-RGM may be associated with social detachment that such employees face. Accordingly, firms that subject their employees to E-RGM settings may internalise the responsibility of facilitating social attachment of their employees in an attempt to avoid it translating into stress or fatigue. This could be done through hiring and retention strategies or by means of HRM practices designed to limit the degree of social detachment of E-RGM employees—especially by targeting those with longer durations away from their traditional family ties. It may be difficult to completely avoid the 'dual life' negative consequences of the E-RGM work settings. For that reason, it may also be advisable for firms to consider how they support the fruition of alternative social relations in the work context, which, at least partially, may alleviate the loss of social relations that these workers otherwise are facing.

The findings of this study also contribute to the literature on work cultures and organisations. Working in remote locations is becoming increasingly common, and certain types of workers often have to work far away from their friends and families. This not only increases the attachment between coworkers, but also increases the loneliness of the workers and potentially lowers their productivity. Indeed, this study may add important aspects to the debate on elevated stress among seafarers (Wadsworth et al., 2008; Lipowski et al., 2014; McVeigh et al., 2019) and point to specific measurements designed to avoid such detrimental effects. We specifically advocate for the instalment of periodic events designed to establish social linkages between employees and that such instalments should formally draw on social network theory in identifying potential social nodes, which are likely to transform into strong social ties with all the positive benefits they represent.

This study offers some insight into the potential consequences of the increasing tendency toward isolated work conditions. The characteristics of work and work settings have tremendous effects on an individual's quality of life and work-life balance, and, therefore, may have a substantial impact on an indi-

vidual's well-being and social capabilities. However, the results of this study suggest that work context may shape an individual's social relations and living arrangements by changing the choices he or she ultimately makes outside work. This paper thereby offers some insight into how geographical distance and context ultimately impact even the strongest social relations, and alter the behaviour of individuals. The paper provides some evidence that suggests that work context may alter one of the most consequential of all economic choices: the geographical context of residence of living.

This paper also provides some renewed views on the recent developments onboard vessels as described by (ITF Seafarers Trust, 2017). Specifically, the decrease in personnel, the tendencies of higher diversity among crew members, the lack of shore leave, faster turnaround schedules and hierarchical command systems may all act as obstacles for the emergence of tight social relations among seafarers. This study clearly indicated that seafarers may increasingly perceive the colleagues at sea as their closest social attachments. However, the changes that are introduced onboard their vessels may hamper this process of socialisation and foster a greater sense of detachment and isolation as the loss of the more traditional social relations to a lesser extent will be replaced by a work-based social network.

An increased reliance on computer-based communications has also led to a decline in the perceived importance of face-to-face communications. In the cases examined in this study, seafarers showed a lower level of attachment to families despite the prevalence of tools that were available to them for online communications (primarily email). We have no data on how frequently the seafarers actually used these technologies, nor whether these technologies were made available to all crew members equally. However, though we know that such technology is widely available on modern vessels, this may very well indicate that the use of new forms of communication are not sufficient to maintain strong social ties. Future research should focus on the role of these forms of communication in maintaining close and productive social attachments in isolated workplaces. Our results provide a preliminary indication that new forms of communication are far less effective for maintaining social attachment in families. Moreover, in the utmost consequence, the decreasing attachment hurts families independently of whether the choice to enter a nomadic lifestyle is dependent on the attachment of the individual (Bowlby, 1980).

6 Conclusion

Our findings clearly suggest that the work conditions of seafarers leave them socially detached from their strongest social ties—namely their closest family. Throughout the paper, we have recognised the limitations of our study (self-selection and confounding factors driving the decision to come ashore and establishment of social ties) in terms of providing unbiased estimates of the hypothesised associations. We have, however, gone to great length in overcoming these potential sources of bias and believe our results are reliable in

capturing the tested associations. Indeed, seafarers clearly rely significantly less on their traditional social ties when making fundamental life-changing decisions and to a greater extent on their ties formed at their work setting. The conclusion from this finding is that the work context of a seafarer has a crucial impact on their social life and life-quality and that this impact is strengthened by the work intensity of the seafarer in terms of durations at sea.

To pinpoint the exact reason why the observed detachment patterns materialise is difficult. One possible explanation could be drawn from the literature on 'dual life' settings and its implications. This literature specifically argues that the lack of contact may increase the negative emotions associated with detachment but may also decrease the emotional benefits associated with day-to-day contact (Diamond et al., 2008; Sliskovic and Juranko, 2019). Given the work-context of the seafarers, it is plausible that both of these mechanisms are in play in generating the identified statistical regularities. It seems to be a fruitful avenue for future research to explore which of these two is the stronger in triggering the observed regularities.

This study provides compelling evidence that warrants further investigations into the mobility aspect of the identified statistical regularities. Another potentially more promising avenue for future research would be to consider more qualitative analysis to supplement our quantitative study. Surveys or in-depth interviews with seafarers would be valuable to understand their behaviour in relation to residential location choices and how these are influenced by different social and economic factors. These methods could also study the level of attachment/detachment with family and friends in general or during different durations of days at sea. Engaging in such studies will offer a more comprehensive understanding of how the work conditions of seafarers impact their health issues, adding to that literature (see, e.g., Lipowski et al., 2014; Sliskovic and Penezic, 2017; McVeigh et al., 2019; Wadsworth et al., 2008).

7 Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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1 Supplementary Material – Data and Method

1.1 Analytical Design and Econometric Technique

We used a conditional logit methodology to investigate the association between the work conditions of a seafarer and his or her social attachment/detachment measured by residential location choice. As a result, we consider each of the 271 regions in Denmark to be a potential choice, which meant that 270 regions received a score of zero because the individual did not relocate to that municipality, while one municipality received a score of 1 because the individual moved there. Each individual was thus observed 271 times in the dataset; each observation represented an individual-municipality combination. Therefore, each of the distance measures was calculated in terms of the distance between each municipality and the municipality of the reference point; for example, to determine the log(distance to parents) variable, the distance to the municipality in which the parents lived, was measured. Our analysis relied on 317,341 observations because we had 1,171 subjects and 271 municipalities.

The conditional logit specification is also known as the McFadden choice model (McFadden, 1974). It effectively compares the characteristics of each potential choice and provides an indication of the likelihood that a particular choice is made given certain covariates. In our case, the covariates express the characteristics of the municipalities and the distance of the municipality to the subjects' social relations. Conditional logit models are characterised by the Independent of Irrelevance Alternatives (IIA) assumption (Ray, 1973). The McFadden choice model (McFadden, 1974) assumes that all alternative options, which in this case are the 271 municipalities, are equally relevant. Adding an additional option will lower the odds of any given choice equally for all locations. The problem could be that the IIA is violated because some residential location choices could be practically and logically irrelevant or possibly clustered. This could bias the estimates. To resolve this possible bias, we estimated mixed logit versions with all independent variable estimates treated as random covariates. The mixed logit does not depend on the IIA assumption. These regressions are displayed in Table 1 in this supplementary file. The mixed logits provide overall support for the findings of the conditional logits. This suggests that any potential bias from violating the IIA assumption in the conditional logits must be negligible.

Table 1 Mixed Logit Regressions on the Residential Location Choice of Former Seafarers and Comparison Group

	Former seafarers				Comparison group	
	Mean	SD	Mean	SD	Mean	SD
Regions attractiveness to former seafarers	18.242***	0.253	16.892***	0.262	12.261***	-3.690
Regions attractiveness in general	-59.740***	-10.250	-54.108***	-5.484	-168.293***	-64.422***
Home city	-1.478***	4.300***	-1.520***	4.468***	-2.694***	1.152**
Ln (Distance to home)	-1.677***	1.500***	-1.660***	1.622***	-1.622***	1.330***
Ln (city size)	1.091***	0.093	1.048***	-0.007	1.323***	0.313*
Ln (Distance to prior residences)	-1.041***	-1.115***	-0.927***	0.926***	-9.640***	1.872**
Ln (Distance to parents)	0.158	1.421***	0.197	1.440***	0.021	1.580***
Ln (Distance to siblings)	-0.304*	0.630**	-0.267***	-0.670***	0.010	0.632**
Ln (Distance to peers)			-0.657***	-1.020		
Log-likelihood	-3,024		-3,011		-2065	
Observations	317,341		317,341		317,341	

Note: Standard errors in parentheses
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Using this methodology provides an opportunity to run fixed effects specifications that take into account the within-subject covariations in the observations. The method makes it possible to compare municipality characteristics, while keeping the characteristics of the individual constant. The conditional logit methodology is frequently used to estimate the (residential) location choice models for individuals and firms (Davies et al., 2001; Figueiredo et al., 2002; Dahl and Sorenson, 2010).

1.2 Data sources and samples

We used the Mariners Database provided by the Danish Maritime Authority. The database contains information on all individuals who worked on Danish commercial vessels between 1997 and 2005, including an individual's job position, the type of vessel that the individual worked on and the employment start and stop dates for each trip onboard a vessel. The data made it possible for us to study how long a seafarer was at sea, as well as to identify who their colleagues were on each specific trip. We used each seafarer's duration at sea as a measurement of how nomadic and isolated the work setting was. The measurement was used as an indicator of each individual's degree of social detachment from traditional and family-based social relations.

For the purpose of this study, we identified a subsection of seafarers—namely former seafarers. These individuals had worked at sea for at least two consecutive years, and then chose to go ashore and remain ashore for at least one year (the third year). To determine the minimum level of effect that an isolated work setting had on a seafarer's social attachments, we included only those seafarers who had been at sea for two consecutive years. By focusing on seafarers who had come ashore, we were able to investigate individuals who were moving into private life settings that were similar and, hence, comparable to the life settings of individuals who came from more traditional workplace settings. To that end, we investigate the residential location choices of former seafarers who relocated their home during the third year.

We combine the Mariner Data with data we obtained from the Danish Database for Labor Market Research (IDA). IDA is collected and maintained by Statistics Denmark. The information obtained from this database made it possible for us to retrieve background information about individuals, including their social relations. This database contains merged information from the Government covering almost the entire labour force in Denmark. The data cover the period from 1980 to 2008, and provide information on each individual's marital status, family status, home and work location, education and employment history. Furthermore, it contains family-based identifiers that allow researchers to determine family linkages through parent identifiers. This dataset was used in previous studies (Bingley and Westergaard-Nielsen, 2004; Sørensen, 2007; Dahl and Reichstein, 2007; Failla et al., 2017).

Both foreign and domestic seafarers in the Danish commercial fleet are included in the Mariners Database. Domestic seafarers are easily tracked on

both the Mariners Database and the IDA database using their personal social security numbers. However, it is not possible to track foreign seafarers sailing on Danish vessels. The IDA database does not include foreign seafarers because it is based on Danish social security numbers. The majority of foreign seafarers are not given a social security number because they are not deemed to be working on Danish soil. Therefore, all the conclusions derived from this study are applicable only to domestic workers and cannot be generalised to encompass foreign workers. It has to be said that this limitation was also motivated by the fact that it becomes difficult to find a sensible match in the traditional workforce for the foreign seafarer.

The panel structure of the combined data extends from 1997 to 2005, which allows us to study seven cohort groups of seafarers; seafarers required data for a period of three years to be considered in the study. The final cohort group consists of seafarers who were at sea between 2003 and 2004, but were on land in 2005. In total, we considered 1,171 former seafarers and their residential location choices.

Matched sample: The research questions emphasise the comparative nature of considering whether the seafarer's experience in an isolated work setting changes his/her social attachments, and hence his or her residential location choices. To conduct this investigation, we identified a sample of comparable control subjects. The control sample represented what the former seafarers and their residential location choice would have been if the seafarers had not been in an isolated work setting. In other words, we identified a group of individuals who had worked in a traditional setting rather than in a nomadic, isolated work setting, but who otherwise had some shared commonalities with the former seafarers. The implication is that they were equally likely to have chosen to be in the kind of isolated work setting that is exemplified by the former seafarers. The purpose of creating a comparable control sample was to avoid the possibility that any significant findings could be attributed purely to self-selection effects. Individuals who seek isolated E-RGM work settings are disposed to detach themselves from their families and social ties in general, and they find it to be less of a problem socially to spend long periods away from their family and friends. By creating a matched sample of non-seafarers who were just as likely to have become seafarers on the basis of some observable social attachment conditions, we intend to eliminate this possible endogeneity bias. The matched sample was therefore formed to decrease the likelihood that any uncovered significance could be attributed to the fact that the former seafarers were inherently footloose and detached individuals.

The matched sample was drawn from the population for the same year that the seafarers came ashore. The sample was an exact match in terms of full-time employment, year and gender. Furthermore, we ensured that the matched individual moved residential location, and not only changed jobs, but also changed to a different industry. The remaining variables used in the matching procedure were the parents' wages, parents' ages, parents' education, whether a parent is/was a seafarer, and sibling is/was a seafarer. Individuals with parents who have a basic education may be more likely to pursue free

educational opportunities that provide promise for higher wages. The variables indicating that the parent is/was a seafarer and/or that the sibling is/was a seafarer were included based on the assumption that individuals who had seafarers in the family were more likely to become seafarers themselves.

We used a propensity score matching procedure (nearest neighbour, with replacement). A control individual could be matched by this procedure to more than one treated individual. This possibility tends to increase the precision of the match and to decrease bias (Caliendo and Kopeinig, 2008). In total, there were 576 unique individuals matched to 1,171 seafarers. We tested the performance of the matching procedure by running a logit regression *ex post*, matching with the treatment condition of being a seafarer as the dependent variable. We found only a weakly significant difference between the two groups in relation to the parents' wages variable. That indicates that the matching procedure was successful. [1]

1.3 Variables

For analysis, we consider one dependent variable, several traditional social relation variables, several family-based social relation variables, a homophily-based social relation variable and some control variables.

Dependent Variable: The dependent variable is the residential location choice of the individual. We divided the country into 271 regions that correspond to the territorial boundaries of municipalities. We then identified the municipality in which a former seafarer chose to relocate when he or she came ashore. That municipality then became the basis for identifying our dependent variable expressed in terms of the individual's residential location choice.

Traditional Social Attachment Variables: We considered a large number of components that are attached to regions to investigate the degree to which individuals chose to locate in the proximity of the traditional social attachment regions. First, we considered whether the chosen municipality was the *home city* of the individual, which we defined as the municipality from which the subject had originally moved. A positive estimate associated with this variable indicated that there was a tendency for this social attachment to cause autocorrelation in residential location choice. Second, we included a non-family based, local social relation variable by measuring the logarithm of the distance in kilometres (log(distance to home)) to the home region prior to relocating. Third, we considered the potential of social relations by including a variable expressing the logarithm of the city size (log(city size)) of the municipality. This was necessary because there might be an urbanisation effect occurring in places where there was a richer environment for social interactions. We therefore expected this variable to portray a positive estimate. Fourth, we included the log(distance to prior residences), which measures the distance of the municipality in which the individual chose to live from the prior municipality in which the individual had lived during the two years prior to coming

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[1] Results of the logit regression are available upon request.

ashore. If the individual lived in more than one municipality, we averaged the logged kilometres between the municipalities. Finding a negative association for the distance-based variables would indicate an attachment to the localised traditional social relations.

Family-based Social Attachment Variables: The strongest social attachments are mostly family-based. Therefore, we use two family relation variables to consider the family-based social attachments in connection with residential location choice after moving. First, log(distance to parents) measured the logarithm of the distance between the municipality where the parents lived and the focal municipality. We used the average distance in cases where two parents lived in different municipalities. Second, we used log(distance to siblings) to measure the distance in logged kilometres between the municipality in which the brothers and/or sisters of the individual lived and the focal municipality. Again, we used an average distance when there were siblings living in different municipalities.

Homophilic-based Attachments: We considered a measure of the distance to peers to determine the importance of peers in an individual's choice of residential location, and the extent to which individuals who have been working in an isolated context have a greater tendency than individuals working in a traditional context shift their social attachments away from traditional and family-based relations to homophilic-based relations. The variable log(distance to past seafarer peers) represents the average distance from co-workers that the individual had worked with on vessels within the previous two years. These peers were on the ship in the same deployment period as the focal individual. Finding a negative estimate for this variable would suggest a homophilic-based agglomeration of similar individuals and, hence, a tendency to shift priorities in social relations that could, in turn, affect an individual's residential location decisions.

Controls: We recognise that many characteristics of locations might influence their attractiveness. Existing research has emphasised the importance of political differences, cultural amenities (Glaeser et al., 2001) and culture. Accordingly, we added *labor market region dummies* to all regressions following the classification of Andersen (2000). Some regions may be more attractive than others for various reasons. Some regions may, for instance, offer more career opportunities, which makes them more attractive as a relocation choice. We include two time-varying regional attraction controls to account for these effects. First, we include regional attractiveness by measuring the ratio of movers that chose that specific region by year. Second, we estimated the regional attractiveness for former seafarers by calculating the number of former seafarers that chose to move to that specific region.

2 Supplementary Material – Supplementary Analysis

To further investigate the way in which the experience of having worked in isolated settings is associated with residential location choice, we divided the observations into subsamples based on the duration of the seafarers' work period, or the average number of days at sea. We expected the associations to be stronger among those who had worked at sea for longer periods because they had less opportunity to sustain their social relations outside their work settings. To test this expectation, we realised that some seafarers were away from home for longer periods, while others worked closer to home or had fewer days at sea. To determine whether the number of days at sea per year was associated with different considerations regarding social relations when the former seafarers make their residential location choices, we divided the seafarers into groups depending on their average number of sea days *per year* for the last five years of their career at sea. We created a dummy variable that was determined by how the observations were categorised into each group. This variable was used as an indicator of the extent to which an individual had been exposed to an isolated work setting. Interacting this dummy variable with the various explanatory variables allowed us to investigate to what degree the isolated lifestyle influenced the residential location choices of the individuals. The results are shown in Table 2. We divided the observations into seafarers who averaged from 1–98 days at sea per year and seafarers who averaged from 99–365 days at sea per year. We also considered the number of sea days per stay at sea per year. We constructed this variable to understand the degree to which having sea days back-to-back would allow a seafarer time to maintain or rekindle social relations.

Table 2 Conditional Logit Regressions on the Residential Location Choice of Former seafarers

	Average Seadays Per Year (1)	Average Seadays *Per Spell* Per Year (2)
Regions attractiveness to former seafarers	19.152***	19.163***
	(1.69)	(1.69)
Regions attractiveness in general	-88.924***	-87.936***
	(11.18)	(11.14)
Home city	0.779***	0.834***
	(0.26)	(0.30)
log(Distance to home)	-1.021***	-1.004***
	(0.09)	(0.10)
log(city size)	1.293***	1.221***
	(0.10)	(0.11)
log(Distance to prior residences)	0.190	0.183
	(0.13)	(0.15)
log(Distance to parents)	-0.450***	-0.270***
	(0.08)	(0.09)
log(Distance to siblings)	-0.218***	-0.370***
	(0.08)	(0.09)
log(Distance to past peers)	-0.062	-0.173
	(0.17)	(0.19)
Seadays variable × *Home city*	0.001	0.001
	(0.00)	(0.00)
Seadays variable × log(Distance to home)	0.000	0.000
	(0.00)	(0.00)
Seadays variable × log(city size)	-0.002***	-0.002**
	(0.00)	(0.00)
Seadays variable × log(Distance to prior residences)	-0.001	-0.002
	(0.00)	(0.00)
Seadays variable × log(Distance to parents)	0.002***	0.001
	(0.00)	(0.00)
Seadays variable × log(Distance to siblings)	0.000	0.003**
	(0.00)	(0.00)
Seadays variable × log(Distance to peers)	-0.002	-0.002
	(0.00)	(0.00)
Labor market region dummies (79)	Yes	Yes
Pseudo R^2	0.51	0.51
Observations	317,341	317,341

Note: Standard errors in parentheses
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The regression results presented in Table 2 suggest that former seafarers locate close to their parents and siblings. However, this effect is less pronounced when days at sea is higher. The longer the duration of their work periods, the lower the absolute value of the estimated coefficient. As the number of sea days experienced by a seafarer increased, the significance of the distance to parents/siblings variable decrease in the seafarer's residential location choice. However, individuals in the group with the most sea days were more likely to relocate to larger cities (significant at a 1% level and 5% level depending on measure of length at sea). These results, whoever, do not provide any evidence regarding prior peers.

While the results presented in Table 2 provide some support for the propositions examined in this study, we must acknowledge that the results are weak. It is possible that the number of sea days per year is too crude a measure to adequately examine this question. For example, some seafarers might have gone on long trips and, thus, been granted longer breaks at home between trips. Other seafarers who had a larger number of sea days might have stayed at home more often because they were working on ferries or close-to-home cargo ships. We found stronger results when we divided the sample into three groups than when we divided the sample into two groups. This suggests that research techniques that result in more variation in the days at sea variable might produce stronger results in support of the propositions examined in this study.

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