

Does Sex Matter? The Role of Sexual and Relationship Satisfaction on Living Apart Together Relationship Transitions

Alexandra-Andreea Ciritel

Abstract: There is limited understanding of how the aspects of sex and relationship quality are related to decisions on whether to move in together, separate or continue dating among living-apart together (LAT) couples. This paper focuses on sexual and relationship satisfaction in understanding LAT relationship transitions into coresidence or separation in Germany. The longitudinal prospective design of the German Panel Analysis of Intimate Relationships and Family Dynamics data (pairfam, waves 1-9) is used. Discrete-time competing risk hazard models on LAT relationship outcomes to coresidence or separation are estimated. The results underline the fact that sexual satisfaction is not related to LAT partners' decision to move in together; however, higher levels of relationship satisfaction are positively related to the decision of moving in with a partner. The models reveal that low sexual and relationship satisfaction are associated with breaking-up relative to still living apart. This study highlights the importance of considering sexual satisfaction in understanding better the risk of separation from a LAT partner, in addition to the global indicator of relationship satisfaction.

Keywords: Sexual satisfaction · LAT relationships · Relationship satisfaction · Event history analysis · Germany

1 Introduction

Living apart together (LAT) is a term generally used to define an intimate relationship between unmarried partners who are not living together but who identify themselves as being in a steady relationship (Levin 2004; Haskey/Lewis 2006). Sex is an important aspect of relationships, with sexual satisfaction being related to increased levels of well-being (Debrot *et al.* 2017), intimacy, commitment (Sprecher 2002; Štulhofer *et al.* 2014) and better health (Galinsky/Waite 2014). It might also play an important role in understanding LAT relationship transitions, defined in this paper as either moving in with or breaking-up from a partner. Moreover, in Western

countries, sexual behaviour and lifestyle have changed in the past 60 years (*Mercer et al. 2013; Herbenick et al. 2017*). In Germany, for example, greater acceptance of non-marital sex (*Klärner/Knabe 2017*), a growing number of (sexual) partners across cohorts (*Hiekel/Fulda 2018*), and a diverse pool of sexual practices (*Haversath et al. 2017*) have been noted. Furthermore, sexual pleasure is very important in non-reproductive sexual activity, and in terms of sexual health for Germans (*Klein et al. 2022*). It is remarkable, however, how little we know about the role of sex in decisions to separate, co-reside, or to continue to live apart. The main focus of this paper is to understand how sexual satisfaction is related to LAT relationship transitions in Germany. In addition, it investigates whether sexual satisfaction would remain an important indicator in explaining these transitions after accounting for relationship satisfaction, an important aspect for LAT relationship stability (*Krapf 2018; Wagner et al. 2019*).

Research on the link between sexual satisfaction and LAT relationship transitions is scarce (*Sprecher 2002; Meggiolaro 2010*). To the best of the author's knowledge, only one previous study used nationally representative data to underline that, in Italy, sexual satisfaction is related to decisions to separate but not to decisions to cohabit or marry (*Meggiolaro 2010*). Nonetheless, these findings might be affected by recall bias since sexual satisfaction accounts were collected retrospectively. Other studies show that high levels of sexual satisfaction are related to LAT couples still being together one year after the survey (*Sprecher 2002*). However, these results are based on a non-representative sample of dating university students, making it hard to generalise from the findings. Moreover, *Sprecher's* study (2002) did not consider the competing event of moving in with the partner, and only followed-up these couples for a period of one year after the survey. This paper investigates how accounts of sexual satisfaction are associated with competing transitions of separation and coresidence, following-up LAT couples for a longer period of time, namely nine years, using a unique survey which collects data prospectively.

Sex is related to relationship stability (*Sprecher/Cate 2004*), and sexual intimacy is enjoyed even at older ages (*DeLamater 2012; Gabb 2022*). Recent research shows that LAT partners share greater compatibility in terms of interest in having sex than cohabiting or married partners (*Ciritel 2022*). However, much of the past demographic research on LAT relationship transitions has focused on other aspects, such as the individual or maternal socio-economic background, the childhood family structure (*Sassler et al. 2010, 2016, 2018*), the intention to move in (*Régnier-Loilier 2016*), how long partners have to travel to see each other and the partners' labour force status (*Krapf 2018*), and the institutionalisation of the relationship (*Wagner et al. 2019*). This paper adds to the literature on LAT relationship transitions by shedding light firstly on how sexual satisfaction relates to LAT relationship transitions in Germany, and secondly on how sexual and relationship satisfaction interrelate in explaining these transitions. To do this, waves 1-9 of the German Panel Analysis of Intimate Relationships and Family Dynamics (pairfam) are used to model the LAT transition for two groups: young adults and those approaching midlife (two birth cohorts, of 1981-1983 and 1971-1973). Discrete-time competing risk models estimate the transition a) to coresidence and b) to separation, relative to the baseline of

continuing to live apart together. This paper argues that both sexual satisfaction and relationship satisfaction are important in understanding LAT relationship outcomes, and reflects on the nature of LAT relationships by discussing the implications of these results.

2 The diversity of LAT relationships

LAT partnerships have begun to grasp the attention of demographers investigating the prevalence and characteristics of LAT individuals, and the meaning of this relationship. Estimates from the German Socio-Economic Panel collected between 2012-2013 show that in Germany, among couples who are 20 years old, 80 percent are in LAT relationships. This proportion drops to about 45 percent among those aged 25, and to about 18 percent among those aged 30, falling to just below 10 percent for respondents in their mid-30s (*Krapf 2018* – calculations based on the German Socio-Economic Panel). Furthermore, the share of people in LAT relationships increased across cohorts: for example, about 20 percent of those aged 25 in 1992-1993 were in a LAT relationship compared with approximately 45 percent in 2012-2013. Just under 10 percent of those aged 30 in 1992-1993 were in a LAT relationship compared with about 18 percent in 2012-2013 (*Krapf 2018*). In other Western countries, roughly 10 percent of the population is in a LAT relationship (*Strohm et al. 2009; Reimondos et al. 2011; Phillips et al. 2013; Régnier-Loilier 2016*).

The meaning of LAT is related to their individual life-course. For those who are older and divorced, and in particular who have children, LAT is an “ideal” type of relationship, with individuals intending to continue living apart (*Liefbroer et al. 2015; Lewin 2018*). These individuals view LAT as an alternative to marriage and cohabitation, where they benefit from intimacy while at the same time retaining an independent lifestyle (*Duncan/Phillips 2010*). However, LAT relationships are mainly encountered among young individuals (*Coulter/Hu 2015; Liefbroer et al. 2015; Pasteels et al. 2017*), aged roughly 20-30 years old. For those who decide to move in together, LAT is considered a stage in co-residential relationship formation (*Liefbroer et al. 2015; Pasteels et al. 2017*) whereas for those who break-up, LAT is an experiment (*Régnier-Loilier 2016*).

3 Sexual satisfaction and LAT outcomes

Social exchange theory¹ stipulates that a romantic relationship is an exchange relationship that involves the negotiation of a distribution of resources, rewards, and costs between partners (*Thibaut/Kelly 1959; Nye 1982*). According to the theory, partners engage in interpersonal exchanges to maximise the rewards (such

¹ “The social exchange theory/framework” is used to refer to a group of theories (models) which explain that human behaviour is based on judgements of costs and rewards.

as companionship, praise, emotional support, sex) and to minimise the costs (such as stress, conflicts, compromises, time commitments; *Foa/Foa* 1980). The theory also suggests that the decisions to continue a relationship or to separate are based on the cost and benefit considerations of each partner.

The social exchange models of relationship satisfaction have been extended to explain sexual satisfaction also in terms of rewards and costs (*Lawrence/Byers* 1995). Sexual costs, defined as anything that creates anxiety, pain, or other negative effects (*Thibaut/Kelly* 1959: 12), generally indicate the negative aspect of sexual satisfaction. Sexual rewards are exchanges evaluated as positive and pleasurable to the individual, referring generally to the positive aspect of sexual satisfaction. There is no specific list as to what sexual rewards or costs are, but past research has shown that many aspects of sex which are related to high levels of sexual satisfaction are defined as rewards, while aspects related to low levels of sexual satisfaction are defined as costs (*MacNeil/Byers* 1997; *Byers* 1999: 199).

Sexual satisfaction is an integral component of sexual health and well-being (*WHO* 2010) and is described as “an affective response arising from one’s subjective evaluation of the positive and negative dimensions associated with one’s sexual relationship” (*Lawrance/Byers* 1995). It was shown that high levels of sexual satisfaction are associated with sexual compatibility, affection, and frequent orgasms (*Byers/Demmons* 1999; *Štulhofer et al.* 2014; *Frederick et al.* 2017). LAT relationships, usually characterised by the lack of structural investments, such as joint mortgages, joint household investments, or children (*Berrington et al.* 2015; *Lewin* 2017; *Carter/Duncan* 2018; *Eickmeyer et al.* 2019). Moreover, qualitative research underlines that LAT individuals who greatly enjoy sexual intimacy with their partners are willing to continue their relationships (*van der Wiel et al.* 2018). These individuals defined their high levels of sexual intimacy experiences in terms of “rewards” they get from the relationship. Consequently, I expect that:

(Hypothesis 1a): LAT individuals who experience high levels of sexual satisfaction will be more likely to move in with their partner (rather than to remain living apart) than those with low or moderate levels of sexual satisfaction.

Low levels of sexual satisfaction might be perceived by LAT individuals as costs to continuing the relationship and might be associated with any decision to break-up. According to psychological research, low levels of sexual satisfaction are associated with sexual costs such as low orgasm consistency, low pleasure, dissimilar level of sexual desire (leaving one partner with a higher sexual desire), incompatibility in sexual preferences (engaging in sexual acts that one partner may dislike but the other may enjoy), lack of self-disclosure, and low emotional intimacy (*MacNeil/Byers* 1997; *Byers* 1999; *Frederick et al.* 2017). High levels of sexual satisfaction are associated with stronger feelings of commitment to and love for a partner, emotional closeness (*Sprecher/Cate* 2004; *Štulhofer et al.* 2014; *Meltzer et al.* 2017), and generally sex reinforces bonding in a relationship (*Schwartz et al.* 2013; *Debrot et al.* 2017). Sexual fidelity (partners who are sexually exclusive to each other; *Carter et al.* 2016) is one of the central pillars in defining commitment for LATs. Conversely, low levels of sexual satisfaction may reflect a lack of bonding and

love between partners, and even infidelity on the part of one of the LAT partners, all of which might ultimately affect the decision to separate. Therefore, I expect that:

(Hypothesis 1b): LAT individuals who experience low levels of sexual satisfaction will be more likely to separate (rather than to remain living apart) than those with moderate or high levels of sexual satisfaction.

The link between sexual satisfaction and LAT transitions has been studied by *Meggiolaro* (2010), who used nationally representative data to show no association between sexual satisfaction and LAT decisions to cohabit or to marry. Yet when compared with couples that are sexually satisfied, couples who are less sexually satisfied were more likely to separate than to continue living apart. However, the author used proxy variables for sexual satisfaction such as frequency of having sex, and frequency of having an orgasm, without acknowledging that sexual satisfaction is not always defined by these two behavioural aspects (*Pascoal et al.* 2013, 2014; *Kontula/Miettinen* 2016; *Frederick et al.* 2017). Moreover, the experience of orgasm is diverse and subjective, especially among females who can experience genital and non-genital orgasm (*Singer/Singer* 1972; *Komisaruk et al.* 2011; *Lousada/Angel* 2011; *Opperman et al.* 2014). Furthermore, as already stated in this paper, the results might be affected by recall bias since the assessments about the frequency of intercourse and orgasm were collected retrospectively. Therefore, individuals' reports could be less accurate than data collected prospectively (*Dex* 1995). This paper uses data collected prospectively and adopts a broad definition of sexual satisfaction without restricting it at sexual frequency, acknowledging the variety of sexual satisfaction experiences.

4 Relationship satisfaction and LAT transitions

Evidence on LAT relationship transitions shows that high levels of relationship satisfaction are associated with the transition to coresidence, whereas low levels of relationship satisfaction are associated with the transition to separation (*Krapf* 2018; *Wagner et al.* 2019). Qualitative evidence, employing arguments from the Social Exchange Framework, underlines how important experiencing high levels of relationship satisfaction is for LAT individuals when it comes to decisions on whether to continue their relationship (*van der Wiel et al.* 2018). The participants have defined the rewarding aspects of their relationship in terms of positive qualities of their partner or enjoying intimacy with their partner. These aspects are mentioned as part of their motivation to continue the LAT relationship. Conversely, relationship costs, such as partners' negative qualities (e.g. a controlling partner) lead to diminished feelings of commitment, especially among younger LAT individuals (*van der Wiel et al.* 2018); participants who have experienced feelings of dissatisfaction were more open to consider alternatives, such as finding a new partner or being single (*van der Wiel et al.* 2018). Similar to the literature on LAT relationship transitions (*Krapf* 2018; *Wagner et al.* 2019), and in line with the Social Exchange Framework, I expect that:

(Hypothesis 2a): Individuals in LAT relationships with higher levels of relationship satisfaction will be more likely to move in together rather than to remain living apart and *(Hypothesis 2b)* those with lower levels of relationship satisfaction will be more likely to separate than to remain living apart.

The psychological literature shows that sexual satisfaction is related to relationship satisfaction (*MacNeil/Byers 1997; Byers 2005; Peck et al. 2005*), and there may be a bidirectional relationship between these two variables (*Sprecher/Cate 2004*). This paper examines the relationship between these variables (see Table 2), and considers them as representing different dimensions of a relationship.

5 Data and Methods

5.1 Pairfam

The data are taken from the German Family Panel pairfam (Panel Analysis of Intimate Relationships and Family Dynamics),² release 9.1 (*Brüderl et al. 2018a*), a nationwide random sample of German-speaking respondents born in 1971-1973, 1981-1983, and 1991-1993. The survey began in 2008 with a representative sample of 12,403 focal participants (referred to as “anchors”) who are followed annually. Pairfam is an ongoing multi-disciplinary, longitudinal study focused on intimate partnerships, parenthood, and family development.

The overall response rate for the initial wave was 37 percent (*Brüderl et al. 2017*). Even if this response rate is low, evidence suggests that it is not very selective (*Hiekel et al. 2015; Huinink et al. 2011*). Firstly, response rates below 40 percent are currently common in Germany (*Brüderl et al. 2018b: 8*). Secondly, the frequency distributions of gender, age, federal states, urban agglomeration type (BIK), marital status, and respondents’ number of children in the German Family Panel do not differ substantially from those in the 2007 Microcensus, a compulsory survey for a 1 percent sample of the population (*Huinink et al. 2011*). The present study analyses data only from respondents in both wave 1 and at least one subsequent wave, using nine pairfam waves (wave 1 was collected between 2008-2009; wave 2 between 2009-2010; wave 3 between 2010-2011, wave 4 between 2011-2012, wave 5 between 2012-2013, wave 6 between 2013-2014, wave 7 between 2014-2015, wave 8 between 2015-2016, and wave 9 between 2016-2017).

5.2 Sample selection

The focus of this paper is to assess how sexual and relationship satisfaction are related to a first-time coresidence or separation from the current LAT relationship. Therefore, the term LAT relationship refers to all partnerships in which the main

² This paper uses data from the German Family Panel pairfam, coordinated by *Josef Brüderl et al. (2018a)*. Pairfam is funded as long-term project by the German Research Foundation (DFG).

respondent identified himself/herself as being in an intimate relationship, not living with his/her current partner, and never having co-resided with this partner before.

In 2008-2009 (wave 1), those in the youngest birth cohort (born in 1991-1993) were aged 15-17 years old. This age span corresponds to adolescence, a period characterised by experimentation, instability, and identity exploration, making it less likely for the individuals in question to progress to a co-residential partnership in Germany (Konietzka/Tatjes 2014). Since the focus of this paper is on relationship transitions, only individuals who responded in wave 1 in the older birth cohorts 1981-1983 (25-28 years old in wave 1) and 1971-1973 (35-38 years old in wave 1) are included. Information about relationship histories is gathered by asking about event changes since the last interview and the timing of these changes. Pairfam provides a dataset of the partnership histories in episode format (*biopart*). The analytical sample is derived by combining information from this dataset with the information provided in the interviews (anchor datasets).

In this paper, all LAT relationships that were ongoing in wave 1 were initially investigated and followed across the 9 waves, irrespective of respondents' sexual identity, whether they previously co-resided with their current partner or not, or whether they have item non-response in the variables of interest. This is the *total sample* of all LAT relationships in wave 1 (1102 respondents). On this sample, I investigated the pattern of response and attrition, which are described in the section below. I went on to build the *initial sample* of LAT relationships, by deleting individuals in a same-sex LAT partnership³ and those who had various data inconsistencies in the event history file (see Appendix, Fig. A1). The initial sample dropped to 1001 respondents. I further excluded those with item non-response in wave 1. All these data decisions led to the *analytical sample*, which consists of 920 LAT individuals in wave 1 followed across nine years or until censoring, thus corresponding to the first nine waves of pairfam. The *analytical sample* consists of 83.5 percent out of *the total sample* of LAT individuals.

5.3 Attrition rates

The attrition rate is calculated on the *total subsample* presented above (1102 individuals). Permanent dropouts (or "attritors") are those who continuously participated for some waves and then left the panel, never to return. In the total sample, the attrition rate by wave 9 is 58.4 percent (Appendix, Table A1). Moreover, in the total subsample, 29.9 percent of respondents attrit between waves 1 and 2. Attrition by wave 2 is particularly important for the analytical sample because people's relationship status is known only at the time of the wave 1 interview, and

³ There are only 24 individuals in a LAT same-sex relationship, which corresponds to 2.17 percent of the total subsample of LAT individuals (1102 individuals), too few to be included in the analysis as a separate category.

I can only allow these people to contribute with just one month in calculating their LAT relationship transitions.⁴

The percentage of temporary dropouts is 15.9 percent out of the *total LAT subsample* in wave 1 (1102 respondents, Appendix, Table A1). I included the temporary dropouts because pairfam surveyed them with a longer version of the Event History Calendar, which retrospectively covers the complete timespan since the last interview.

5.4 Analytical strategy and outcome variable

I fit a discrete-time multinomial event history model, where respondents contribute person-months to the data until they experience one of the following events: either moving in with their partner (coresidence), splitting up from their partner (separation), or being censored (e.g. because they attrit from the survey, or because they reach the end of the 97th month observation window).

The discrete-time competing-risk hazard model takes the following functional form (Alison 1984; Sassler *et al.* 2018):

$$\log \left[\frac{p_{ijt}}{1 - p_{ijt}} \right] = \alpha_{ij} + \sum_{m=1}^M \beta_m X_{mij} + \sum_{n=1}^N \beta_n X_{nij(t-1)}, \quad (1)$$

where P_{ijt} is the conditional probability of experiencing coresidence or separation ($j = 1$ for coresidence, or $j = 2$ for separation; $j = 0$ for censored cases) for individual i at month t , given that he/she has not yet experienced an event or been censored before month t . α_{ij} is a set of dummy variables to control for time dependence (in yearly increments). After exploring other specifications of duration, I chose the yearly interval measure because this was found to be optimal, and has the best model fit (using six-month intervals yielded a higher Bayesian Information Criterion (BIC) when compared with the yearly interval function of duration, results not shown, available upon request from the author); furthermore, a similar approach was used in studying the transition from LAT to coresidence or separation using pairfam data (Krapf 2018; Wagner *et al.* 2019). A set of M time-constant variables as well as N time-varying variables (measured at time $t-1$) are included in the model. Among the key variables of interest, all are considered time-varying. I assume that the outcomes are distinct events influenced by different underlying mechanisms (Alison 1984).

⁴ The wave 1 characteristics of those who attrited by wave 2 in terms of gender, cohort, education, and employment status are similar to all those remaining in at least one subsequent wave (Appendix, Table A2). This indicates that, even if this attrition rate is not negligible, it does not indicate a strong selection effect for those who remain in the subsequent waves. Consequently, the LAT relationships lost due to attrition by wave 2 are having a greater effect on the sample size than on its composition.

All individuals in a LAT relationship enter the risk set for transition to either of the destination states in wave 1. The duration variable is time (in months) in LAT since the start of the relationship until event occurrence. It is preferable to have the duration variable in months since the outcome is measured in months even if the covariates are updated at the time of the annual interview (*Alison 1984; Sassler et al. 2018; Perelli-Harris/Blom 2021*).

Time-varying variables, such as relationship satisfaction and levels of education had some missing values, either because the individuals experienced wave non-response after wave 1 or because they participated in each survey wave but did not answer these particular questions after wave 1 (item-missing). In both of these cases, I used the most recent value of the covariate (*Singer/Willet 2003: 553*).

5.5 Sexual and relationship satisfaction

Sexual satisfaction asks: “How satisfied are you with your sex life?”, measured on an 11-point scale (where 0 is Very dissatisfied and 10 Very satisfied). Because the distribution of the data is right-skewed, I grouped the points 0-6 into “low”, 7-8 into “moderate”, and 9 to 10 into “high level of sexual satisfaction”. The “no answer” category includes those who did not know and those who did not want to answer.

Respondents are asked to rate their satisfaction in the current relationship by answering the question “All in all, how satisfied are you with your relationship?” The variable is measured on an 11-point scale (where 0 is Very dissatisfied and 10 is Very satisfied).

As the item non-responses for relationship satisfaction in wave 1 were less than 1.5 percent, they have been deleted from the analysis. Since the proportion of item non-responses for sexual satisfaction was higher (6.4 percent), I kept them in the analysis.

5.6 Additional control variables

The existing literature on the outcomes of LAT relationships points to the importance of the intention to move in, or to marry (*Régnier-Loilier 2016; Wagner et al. 2019*), the socio-economic condition of the couple and the amount of time partners have to travel to see each other (*Krapf 2018*), as well as the cost of already having a child (*Krapf 2018; Wagner et al. 2019*). The intention to move in with a partner might be endogenous to the LAT outcomes and thus is not included in this analysis.

Gender and cohort are dummy variables indicating – as reference categories – being a female, and belonging to the youngest cohort (1981-83) respectively. The relationship duration from the beginning of the partnership is measured in months. Respondents’ educational attainment is based on the International Standard Classification of Education (ISCED 97) and is divided into low, medium, and high educational attainment. The couple’s employment status is a categorical variable indicating whether both partners are employed, one is employed, or neither is employed. This is the only couple-level variable used because the other variables had a high non-response rate from the partner. I control also for the amount of

time required to travel to see the partner, and whether the respondent has children or not. Respondents' children can be from a previous partner, a current partner, from mixed partners, adopted, or fostered. These children can be co-residential or non-co-residential. Guided by previous work (*Krapf 2018; Wagner et al. 2019*), the travel time to a partner is categorised so as it captures short (travel time of less than one hour), and long-distance relationships (travel time of one hour or more). This study also includes a dummy variable indicating if respondents live in East Germany, and the urban conglomerate. These two variables are used in computing the post-stratification weights and are included to account for the disproportionately stratified sample in the first wave.

All the variables are time-varying except for gender, cohort, and relationship duration. The inclusion of variables such as cohort, relationship duration, education, employment, and having children aims to account for selection effects into different types of LAT relationship.

6 Results

6.1 LAT transitions and partnership duration analysis

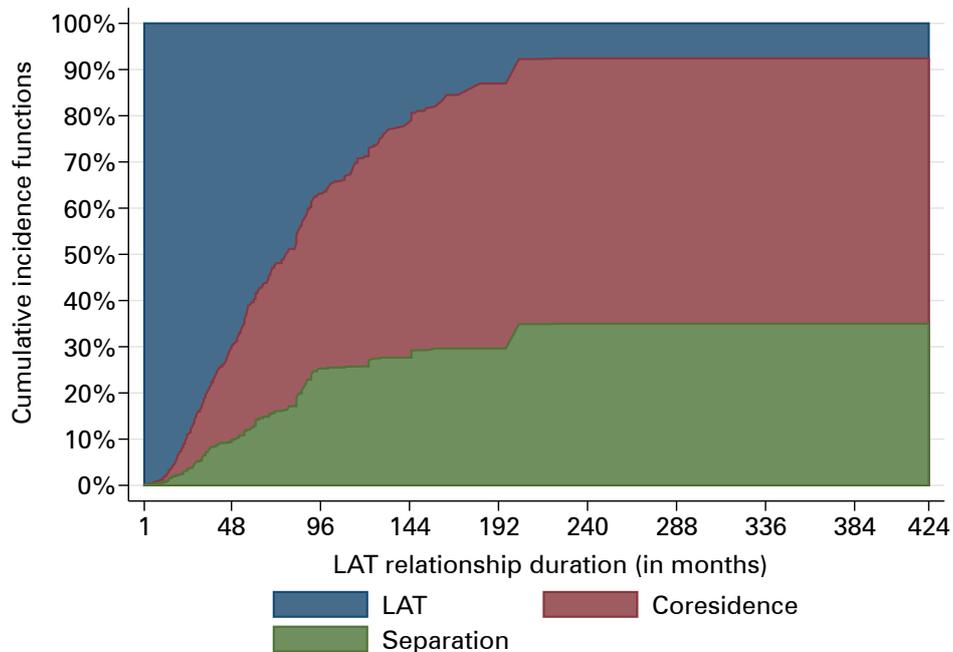
Figure 1 below presents the cumulative proportions of entry into coresidence and separation on the analytical sample (920 LAT individuals).

In the analysis, I consider 10,502 relationship months from 920 LAT individuals. Approximately 7 percent of LAT individuals continued to live apart, approximately 34 percent of LAT individuals separated, and approximately 59 percent co-resided by the end of nine years since the relationship began. This suggests that for most of the young and midlife individuals included in the sample, LAT is a stage in the formation of co-residential relationships. For 28 individuals in the sample, the month of marriage was the same as the month in which coresidence began (3 percent of the analytical sample; results not shown, available upon request). This finding suggests that direct marriage is an isolated phenomenon among young adults and those in midlife in Germany, and that the vast majority of respondents prefer to cohabit.

To account for the duration of LAT relationships, four categories have been created: < 1 year, 1 to <2 years, 2 to <3 years, 3 to <4 years, and 4+ years, similar to previous studies using the same data to study LAT transitions (*Krapf 2018; Wagner et al. 2019*). This categorical variable allows to capture non-linearity.

6.2 Sample characteristics at interview

The distributions of key variables measured in wave 1 are shown in Table 1. In wave 1, the highest proportion of LAT individuals declared high levels of sexual satisfaction (43.8 percent), followed by those who declared moderate (28.7 percent), and low levels (21.1 percent). Only a minority of the sample (6.4 percent) did not respond to this question. The mean of relationship satisfaction among all LAT respondents was

Fig. 1: LAT relationship transition risks into coresidence and separation

Source: pairfam data, own calculations

relatively high ($M = 8.18$), indicating that LAT individuals were satisfied overall with their relationship in wave 1.

If the two variables are considered to be continuous, the Pearson correlation coefficient suggests a moderate correlation, $r = 0.33$, indicating that they tap into different dimensions of relationships. The relationship between these key independent variables is further investigated via a one-way analysis of variance (ANOVA) in Table 2 below.

If sexual satisfaction is considered to be categorical, the one-way analyses of variance (Table 2) show that there are statistically significant differences in the means of relationship satisfaction between at least two sexual satisfaction groups. Tukey post-hoc tests run after ANOVA analysis (results not shown, available from the author upon request) show that the mean of relationship satisfaction is significantly higher only in the high sexual satisfaction group (mean = 8.97) than in the no response (mean = 7.93), low (mean = 6.80), and moderate sexual satisfaction (mean = 8.06) groups.

Descriptive statistics of the analytical sample in wave 1 are shown in Table A3 and Table A4 in the Appendix. There are more LAT individuals in the 1981-83 birth cohort (78.4 percent) than in the 1971-73 birth cohort (21.6 percent), and this is consistent with the literature which states that LAT is most often encountered at younger ages (Coulter/Hu 2015; Liefbroer *et al.* 2015). Slightly more males (52.7 percent) than

Tab. 1: Distribution of sexual satisfaction at wave 1. Means (and standard errors) of relationship satisfaction at wave 1

Variables	%
Sexual satisfaction	
No response	6.4
Low	21.1
Moderate	28.7
High	43.8
Total	100
Variables	Mean (SE)
Relationship satisfaction (0-10)	8.18 (0.06)

Note: unweighted percentages; sexual satisfaction and relationship satisfaction are measured at wave 1; S.E. – standard errors; unweighted results.

Source: pairfam data, own calculations

Tab. 2: One-way analyses of variance (ANOVA) of relationship satisfaction by levels of sexual satisfaction at wave 1; analytical sample

Sexual satisfaction	Summary of relationship satisfaction						
	Mean	Standard deviation	Standard error (mean)	Min	Max	Frequency	P-value
No response	7.93	2.55	0.33	0	10	59	0.000
Low	6.80	2.81	0.20	0	10	194	
Moderate	8.06	1.72	0.11	0	10	264	
High	8.97	1.44	0.07	0	10	404	
Total	8.18	2.12	0.07	0	10	921	

Note: unweighted data.

Source: pairfam, own calculations on the variables measured at wave 1

females (47.3 percent) are in a LAT relationship in wave 1. Most LAT respondents have a medium level of education (53.4 percent), are employed and their partner is employed (57.7 percent), have to travel less than one hour to see their partner (80.8 percent), do not have children (80.9 percent), and live in West Germany (81.8 percent). About a quarter (24.9 percent) live in a periphery area, and about a third of LAT individuals had been together for four years or more (35.1 percent). Most individuals in the birth cohort 1971-1973 are married (63.1 percent), indicating LATs are a selected group of people at this life stage.

6.3 Multivariate results

The relative risk ratios⁵ of entering coresidence or separation relative to continuing in a LAT relationship are presented in Table 3, in three sequential models.⁶ The first model examines the association between sexual satisfaction and the LAT transitions with only the control variables included, and tests whether sexual satisfaction is related to LAT relationship transitions. The second model includes the indicator for relationship satisfaction and the control variables, but excludes the indicator for sexual satisfaction, assessing how relationship satisfaction is related to LAT relationship transitions. Model 3 includes back the indicator of sexual satisfaction and tests whether it would still be an important indicator for explaining the LAT relationship transitions after accounting for relationship satisfaction. Model 3 represents the full model.

The relative risk ratios on the *transition to coresidence* are presented in the left-hand column of Table 3. Model 1 shows the link between sexual satisfaction and LAT individuals' relative risk of moving in with their partner compared with continuing to live apart. In Model 1, no evidence was found to suggest that sexual satisfaction plays an important role in LAT individuals' decision to move in with their partner, hypothesis 1a not being supported by the data. Model 2 shows that higher levels of relationship satisfaction are associated with LAT individuals' decision to move in with their partner relative to continuing to live apart, indicating support for hypothesis 2a. Finally, in Model 3, when sexual satisfaction is included, it is noticed that a) the coefficients of sexual satisfaction do not change very much in size, direction, or significance compared with Model 1 (indicating no support for hypothesis 1a), and b) relationship satisfaction remains associated with LAT transitions to coresidence (as it was in Model 2, supporting hypothesis 2a). All in all, Model 3 reveals that the transition to coresidence is associated with higher levels of relationship satisfaction.

⁵ Caution must be used in interpreting the change in the coefficients across these nested models when the outcome is non-linear due to rescaling (Mood 2010). However, one way to account for this problem is to calculate average marginal effects (AME; Mood 2010), an approach often used in demography (Visser et al. 2016; Krapf 2018). The direction and significance between the models with AME and relative risk ratios do not differ. Consequently, the models with competing risk ratios are presented in the paper for ease of interpretation (results not shown, available upon request from the author).

⁶ Some sensitivity analyses were carried out. Firstly, the main results did not change in models with a complete case approach (including people to the point when they dropped out from the panel), where all individuals with wave or item non-response are excluded. Therefore, the model with the imputation approach is shown in the paper since it has more observations. Secondly, the main results did not change when excluding the number of non-responses for sexual satisfaction. Thirdly, the effect of sexual and relationship satisfaction on LAT relationship transitions does not differ across life-stages and gender. Lastly, the inclusion in the model of a variable measuring the number of previous partners, which is part of LAT individuals' background characteristics, did not change the main results; also, it showed no relationship with the outcomes. Therefore, a more parsimonious model is presented in the paper (results not shown, available from the author upon request).

Tab. 3: Relative risk ratios (RRR) from the competing risk discrete-time event history analysis on LAT relationship transitions

	Coresidence vs LAT			Separation vs LAT		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
<i>Relationship duration (ref. 1 to < 2 yrs)</i>						
< 1 year	1.13	1.12	1.11	2.02**	2.11**	2.09**
2 to <3 years	0.76	0.77	0.77	0.92	0.93	0.90
3 to <4 years	0.64**	0.65**	0.64**	0.56**	0.59*	0.55**
4+ years	0.30***	0.32***	0.32***	0.40**	0.40**	0.38**
<i>Sexual Satisfaction (ref. Low)</i>						
No response	1.31	-	1.18	1.07	-	1.26
Moderate	0.92	-	0.83	0.48***	-	0.54**
High	1.10	-	0.91	0.50***	-	0.63*
<i>Relationship satisfaction</i>						
	-	1.11**	1.11**	-	0.88***	0.90**
<i>Cohort (ref. 1971-1973)</i>						
1981-1983	1.26	1.20	1.21	1.50*	1.57*	1.58*
<i>Gender (ref. Male)</i>						
Female	1.27*	1.27*	1.27*	0.95	0.95	0.96
<i>Education (ref. Low)</i>						
Medium	0.79	0.75	0.79	1.06	0.97	1.09
High	1.04	0.96	1.02	1.05	0.97	1.12
<i>Couple's employment status (ref. non-employed)</i>						
Both non-employed	0.89	0.90	0.89	0.73	0.74	0.74
One employed	0.95	0.94	0.95	0.96	0.94	0.97
<i>Time spent travelling to partner (ref. <1 h)</i>						
>1 h	0.98	0.97	0.96	1.35+	1.46*	1.41*
<i>Respondent has children (ref. No)</i>						
1 or more children	0.83	0.84	0.85	1.55*	1.53+	1.53+
<i>Living in East Germany (ref. No)</i>						
Yes	0.98	0.96	0.96	0.80	0.82	0.82
<i>Urban conglomerate (ref. Region < 20,000)</i>						
City Centre						
500,000+	1.17	1.11	1.11	1.33	1.48	1.44
Periphery 500,000+	1.21	1.18	1.16	0.70	0.76	0.75
City Centre 50,000-						
500,000	1.04	1.04	1.03	0.54*	0.58*	0.55*
Periphery 50,000-						
500,000	0.88	0.85	0.85	0.83	0.90	0.87
Region 20,000-						
50,000	1.02	1.01	1.01	0.78	0.82	0.78

Tab. 3: Continuation

	Coresidence vs LAT			Separation vs LAT		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
<i>N (person-months)</i>	10502	10502	10502	10502	10502	10502
<i>Log-likelihood</i>	-2468.56	-2547.52	-2457.96	-2468.56	-2547.52	-2457.96
<i>AIC</i>	5025.12	5012.52	5007.93	5025.12	5012.52	5007.93
<i>Adjusted McFadden R²</i>	0.014	0.016	0.017	0.014	0.016	0.017

Note: unweighted results; LAT – living apart together relationship; ref – reference category; AIC – Akaike Information Criteria; *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.10$.

Source: pairfam, own computation

The effect sizes and significance of control variables do not change much across these three models, which is the reason why I focus on the findings from Model 3.⁷ Other covariates associated with the start of coresidence include being together for less than 2 years as compared with being together for 3 years and more, a finding similar to the literature on LAT transitions in Germany (Krapf 2018; Wagner *et al.* 2019). The finding may suggest a selection effect of those who are happier with their relationship. At the same time, those who are in long-term relationships may have other reasons for not moving in together, such as co-residential children or placing more value on an independent lifestyle. Women are more likely than men to move in with a partner rather than continuing to live apart.

A respondent's education, couples' combined labour force status, the presence of children, the time taken to travel to see a partner, and the region where people live are not associated with LAT outcomes.

For the *competing risk of separation*, shown in the right-hand column in Table 3, Model 1 shows a statistically significant relationship between sexual satisfaction and LAT relative risk of separation compared to continuing to live apart. Those who report high or moderate levels of sexual satisfaction as compared to those with low levels are less likely to break-up relative to remain living apart, supporting hypothesis 1b. Model 2 shows that the higher the relationship satisfaction, the less likely LAT individuals are to separate relative to continue living apart, supporting hypothesis 2b. Finally, in Model 3, when relationship satisfaction is included, it is noticed that a) sexual satisfaction remains significant in explaining LAT transitions to separation, with coefficients in the same direction (as Model 1 shows, indicating support for hypothesis 1b), and b) relationship satisfaction is still negatively associated with

⁷ Model 3 is the full model (with sexual and relationship satisfaction variables and covariates) and also has the best fit; both model fit parameters, namely log-likelihood and Akaike Information Criteria, are smallest in Model 3 compared with the other two models. Also, the adjusted McFadden R^2 is highest in Model 3.

LAT transitions to separation (as Model 2 shows, indicating support for hypothesis 2b). All in all, the models reveal that the transition to separation is associated with rather low levels of both sexual and relationship satisfaction.

Couples who have been together less than a year are more prone to separate than those who have been together between one and two years. Similarly, those who have been together for more than three years are less prone to separate than those who have been together between one and two years. This may reflect that longer LAT relationships are more selected than those formed less than a year or two. Compared with adults in midlife, young adults are more prone to separate, thereby suggesting that the chances of repartnering if one does not like one's partner are higher when young. Studies investigating remarriage show that the pool of single persons is larger at younger ages than in midlife and that the social opportunities to meet a spouse/partner decline with age (*de Graaf/Kalmijn 2003; Schimmele/Wu 2016*). The amount of time LAT partners have to travel to see each other and having at least one child are factors associated with the likelihood of separation, consistent with the literature in Germany (*Krapf 2018*). Also, living in the city centre as opposed to a region with fewer than 20,000 inhabitants is associated with LAT transition to separation.

7 Discussion

Although sexual pleasure is a fundamental element of couples' lives and sexual health (*WHO 2010; Schwartz et al. 2013; Klein et al. 2022*), demographers have by and large ignored sexuality in their study of the nature of partnerships. To the best of the author's knowledge, this paper is the first to investigate how sexual satisfaction relates to LAT relationship transitions, using a representative sample of LAT couples. It also examines how sexual satisfaction interrelates with relationship satisfaction in understanding LAT relationship transitions. This study shows that for most young and midlife individuals, LAT is a temporary stage in coresidential partnership formation since more individuals move in together rather than separate within nine years since the start of their relationship.

Interestingly, sexual satisfaction was not related to LAT partnership transition to coresidence as it was hypothesised. This is surprising since high levels of sexual satisfaction are associated with frequent orgasms, sexual compatibility, and intimacy (*Štulhofer et al. 2014; Frederick et al. 2017*), which are important aspects in any relationship (*Muise et al. 2016*). Nonetheless, the findings are consistent with those of *Meggiolaro's* study (2010) which shows that there is no association between sexual satisfaction and LAT transitions to coresidence or marriage in Italy. It may be that LAT couples prefer to continue living apart as opposed to moving in together out of a concern that living together might reduce their sexual pleasure. Qualitative research found that some individuals, who were committed to and happy with their LAT partner, believed that their satisfaction would remain higher when living separately, worrying that cohabiting would not be beneficial to their relationship (*van der Wiel et al. 2018*). Moreover, demographic evidence shows no link between high

levels of relationship quality and the likelihood of having children (*Rijken/Liefbroer* 2008; *Rijken/Knijjn* 2009; *Rijken/Thomson* 2011). The authors explained that the partners may not want to change the dynamics of their relationship whenever they enjoy high levels of relationship quality. At the same time, coresidential partners show their (structural) commitment through joint investments such as buying a house, paying the mortgage together, and having children (*Berrington et al.* 2015), which are not characteristic features of LAT relationships (*Carter/Duncan* 2018). It may be, then, that relationship dynamics other than sex lead to the decision to move in together, such as partners' income, savings, values, or communication. Future research may investigate these facets more when studying coresidential relationship formation.

On the other hand, sexual satisfaction was related to the outcome of separation: those with low sexual satisfaction as compared to those with moderate or high levels of sexual satisfaction are more prone to break-up, consistent with hypothesis 1b. This work reinforces *Meggiolaro's* finding (2010) that, when compared with couples with higher levels of sexual satisfaction, less sexually satisfied couples are more prone to break-up than to remain living apart. Despite using different data and indicators to capture sexual satisfaction, *Meggiolaro* investigated individuals in a LAT relationship in a similar age range as this study: between 18-26 years old (born between 1980-1988) and 27-36 years old (born between 1970-1979). It would be interesting if future research compares and contrasts the importance of sexual satisfaction in the decision to break-up among LAT couples in the same or even later life-stages, and in other countries as well.

Relationship satisfaction plays an important role in LAT respondents' decision to separate or to move in with their partner. This finding is consistent with hypotheses 2a and 2b, and supports previous studies in Germany (*Krapf* 2018; *Wagner et al.* 2019). However, this paper went beyond these existing studies, engaging with sexual aspects of relationships, and bringing new understanding on the nature of LAT relationships. High levels of sexual satisfaction are important in decisions to remain living apart (and perhaps to sexually experience and test the relationship). However, sexual satisfaction is not an important factor for LAT partners when deciding to take the next step and move in together; such decisions depend more on the relationship as a whole.

8 Limitations

The analysis has some limitations. First, despite this research being longitudinal, causal effects between relationship and sexual satisfaction and LAT outcomes cannot be assumed. Secondly, the results are not representative for the entire population of LAT relationships because the paper includes two cohorts: 1981-1983 (25-28 years old in wave 1) and 1971-1973 (35-38 years old in wave 1), leaving out people aged between 20-24 and 29-34 years old, and those older than 38 years old. Thirdly, individuals in a LAT relationship born between 1971-1973 are selective since most respondents in this cohort are married (Appendix, Table A4). However,

in the analysis, I control for background characteristics of the people that would be in LAT at this later life stage, such as employment, education, and the number of children. Fourthly, future research might consider using the whole panel structure by adding new individuals in LAT relationships from subsequent waves. Lastly, a monthly set-up of the data rather than a yearly set-up may affect the accuracy of the results since the time-varying covariates are updated annually. Nonetheless, since the dependent variable is updated in months, the person-month set up is preferred despite the annual update of the covariates. Moreover, this approach is similar to other studies in demography, where a person-month data set-up has been applied when the dependent variable was updated monthly, despite an annual update of the time-varying covariates of interest (*Sassler et al.* 2016, 2018; *Bastin* 2019; *Perelli-Harris/Blom* 2021).

This analysis also has conceptual limitations that are related to how sexual satisfaction is defined. Respondents are asked if they have an intimate partner with whom they are not living. Pairfam measures sexual satisfaction by asking the participants how satisfied they are with their sex life, the question lacking the words “with the partner”. Therefore, it might be that some participants based their answers on solitary sexual behaviour (i.e. masturbation; (*Mercer et al.* 2013)), sex with other partners, sexting, or sending intimate pictures (*Ouytsel* 2020). I recommend that pairfam or any demographic survey should include a more specific indicator measuring sexual satisfaction “with the partner”. This is important because these people have a relationship at distance and therefore they may more often practice solitary sexual behaviours, might send more intimate pictures, or have more opportunities to cheat on their partner than coresidential couples.

All in all, this research underlines the need to go beyond the global measure of relationship satisfaction in better understanding LAT relationship outcomes, emphasising the importance of investigating the sexual dimension of relationships. Future research might incorporate other indicators of sexuality, such as sexual frequency or compatibility between partners in terms of sexual practices, which might be important in understanding the nature of LAT relationships and coresidential formation.

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Dr. Alexandra-Andreea Ciritel (✉). University of Southampton, Faculty of Social Sciences. Centre for Population Change. Southampton, United Kingdom.
E-mail: aa.ciritel@soton.ac.uk
URL: http://www.cpc.ac.uk/about_us/the_team/1142/Alexandra_Ciritel#associates

Appendix

Tab. A1: The pattern of response in the total subsample of LAT individuals in wave 1 and at least one subsequent wave; pairfam

LAT pattern of response in all 9 waves	% unweighted
Those who participated in wave 1 and 2 and attrited after wave 2	28.5
Attrited by wave 2	29.9
Full response	25.7
Temporary dropouts	15.9
Total	100

Note: this table refers to the total subsample of 1102 LAT respondents in wave 1 and at least one subsequent wave; unweighted results; the group 'attrited by wave 2' refers to those who participated just in wave 1.

Source: pairfam data, waves 1-9, own calculations

Tab. A2: Comparison between those attrited by wave 2 and those who are not, by gender, cohort, education, employment status, and mean years of education; total subsample of LAT individuals in wave 1 and at least one subsequent wave

Variables	Those in wave 1 and at least one subsequent wave		Attrited by wave 2		Total	
	Numbers	% or mean (SD)	Numbers	% or mean (SD)	Numbers	% or mean (SD)
<i>Gender</i>						
Male	397	51.4	179	54.4	576	52.3
Female	376	48.6	150	45.6	526	47.7
<i>Birth cohort</i>						
1981-1983	577	74.6	261	79.3	838	76.0
1971-1973	196	25.4	68	20.7	264	23.9
<i>Educational attainment</i>						
Low	63	8.2	23	7.0	86	7.8
Medium	403	52.1	188	57.1	591	53.6
High	307	39.7	118	35.8	425	38.5
<i>Employment status</i>						
Not employed	251	32.5	99	30.1	350	31.8
Employed	522	67.5	230	69.9	752	68.2
<i>Mean for years of education</i>						
	-	13.06 (3.14)	-	12.96 (3.17)	-	13.03 (3.15)
Total	773	100	329	100	1102	100

Note: unweighted results; these calculations are made based on the total subsample of LAT individuals in wave 1 followed across all 9 waves, which consists of 1102 homosexual and heterosexual individuals in a LAT partnership in the two birth cohorts.

Source: pairfam data, waves 1-9; owns calculations

Tab. A3: Descriptive statistics of the analytical sample at wave 1; pairfam

Variables	Frequency (unweighted)	Percent (unweighted)
<i>Cohort</i>		
1971-1973	198	21.6
1981-1983	722	78.4
<i>Gender</i>		
Male	485	52.7
Female	435	47.3
<i>Respondent's education</i>		
Low	62	6.7
Medium	491	53.4
High	367	39.9
<i>Couple's combined labour force status</i>		
Both employed	530	57.7
Both non-employed	91	9.9
One employed	299	32.5
<i>Time spent travelling to partner</i>		
< 1h	744	80.8
> 1h	176	19.2
<i>Respondent has children</i>		
No	745	80.9
Yes	175	19.1
<i>Living in East Germany</i>		
No	752	81.8
Yes	168	18.2
<i>Urban conglomerate</i>		
City Centre 500,000+	176	19.1
Periphery 500,000+	88	9.6
City Centre 50,000-500,000	169	18.4
Periphery 50,000-500,000	229	24.9
Region 20,000-50,000	145	15.7
Region < 20,000	113	12.4
<i>Time in LAT</i>		
< 1 year	217	23.5
1 to < 2 years	158	17.1
2 to < 3 years	125	13.5
3 to < 4 years	97	10.5
4+ years	323	35.1
Total	920	100

Note: time in LAT since the beginning of the union; unweighted results.

Source: pairfam, wave 1, own calculations

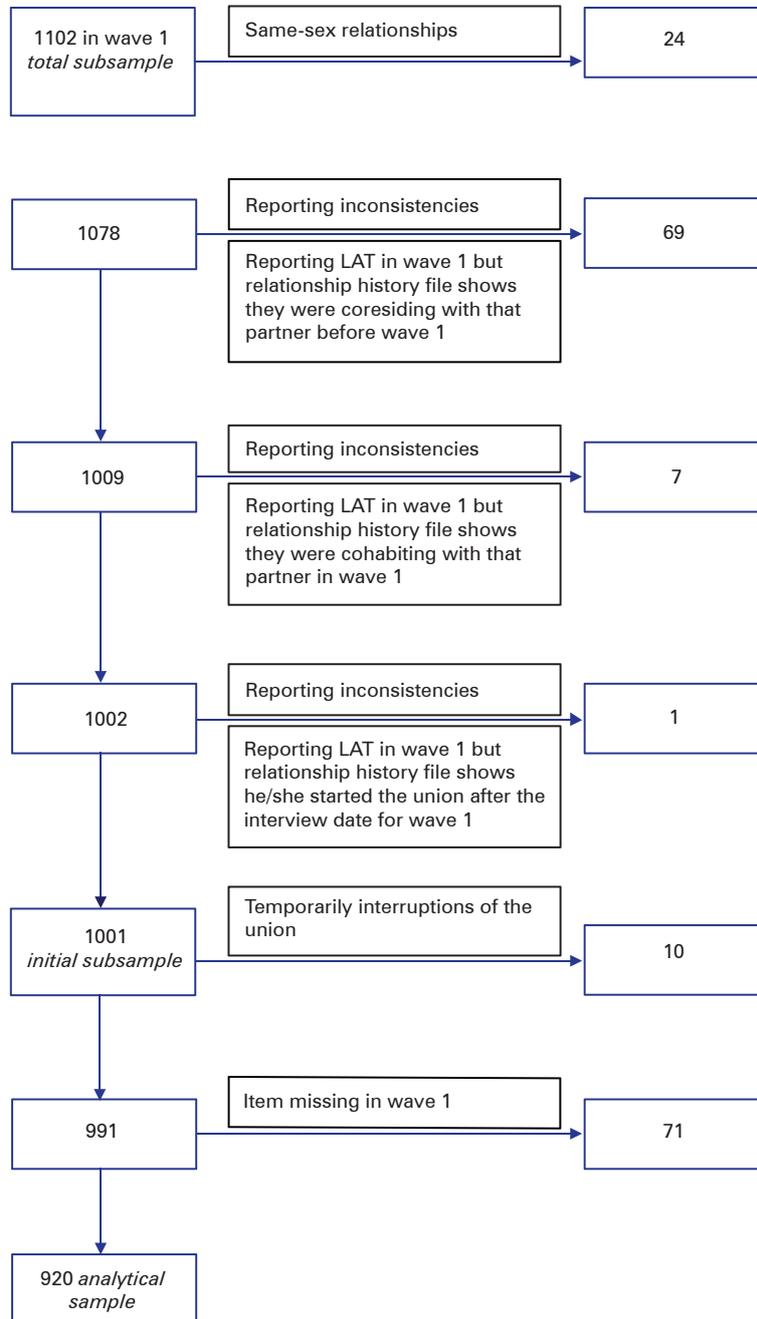
Tab. A4: Relationship status among all respondents in the birth cohort 1971-1973; pairfam, wave 1

Relationship status of those born in 1971-73 in wave 1	Frequency (unweighted)	Percent (unweighted)
Incomplete data	8	0.2
LAT	264	6.5
Single	695	17.1
Cohabiting	528	13.0
Married	2559	63.1
Total	4054	100

Note: unweighted sample.

Source: pairfam, wave 1, own calculations

Fig. A1: Diagram showing the selection of the analytical sample of LATs



Source: pairfam, waves 1-9; author's diagram

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