The Development of Loneliness Through Adolescence and Young Adulthood:

Its Nature, Correlates, and Midlife Outcomes

Tilmann von Soest

University of Oslo and OsloMet – Oslo Metropolitan University, Norway

Maike Luhmann

Ruhr University Bochum, Germany

Denis Gerstorf

Humboldt University Berlin, Germany

Author Note

Tilmann von Soest, PROMENTA Research Center, Department of Psychology, University of Oslo, Oslo, Norway, and Norwegian Social Research, OsloMet – Oslo Metropolitan University, Oslo, Norway; Maike Luhmann, Department of Psychology, Ruhr University Bochum, Bochum, Germany; Denis Gerstorf, Department of Psychology, Humboldt University Berlin, Berlin, Germany.

Correspondence concerning this article should be addressed to Tilmann von Soest, Department of Psychology, University of Oslo, P.O. Box 1094 Blindern, 0317 Oslo, Norway. E-mail: t.v.soest@psykologi.uio.no.

Abstract

Adolescence and young adulthood are characterized by substantial sociodemographic, family, social, and personality changes that may influence loneliness. Although loneliness is a public health challenge, we know little about how loneliness develops during these periods. Our study addresses this lacuna by using four-wave longitudinal data from 3,116 Norwegians aged 13 to 31 years, making use of questionnaire (key facets and correlates of loneliness) and register linkage information (midlife outcomes). Analyses revealed that when asking directly about feeling lonely and for emotional facets, loneliness increased from early adolescence to age mid-20s, whereas social facets of loneliness declined gradually and plateaued when people had reached their mid-20s. Several predictors operated consistently across loneliness facets, whereas others operated in facet-specific ways. To illustrate, perceiving one's parents as caring, having close friends, not leaving the parental home before age 18, and reporting more agency were each associated with less loneliness across assessment modes. In contrast, when asked directly, women reported more loneliness than men at all ages, whereas men reported more social loneliness. Finally, adolescents and young adults who reported feeling lonely and/or increased in loneliness were consistently at higher risk for disability and lower income in midlife, whereas other important midlife outcomes including education, labor market inclusion, and prescriptions of antidepressants exhibited facet-specific associations. Our study is the first to provide a comprehensive picture of loneliness development throughout the second and third decade of life and highlights the multidimensionality and multidirectionality of loneliness trajectories and correlates across adolescence and early adulthood.

Keywords: loneliness, adolescence, young adulthood, midlife, longitudinal

The Development of Loneliness Through Adolescence and Young Adulthood:

Its Nature, Correlates, and Midlife Outcomes

Humans have fundamental needs to establish and maintain strong and stable interpersonal relationships, and people often experience feelings of loneliness when these needs are not sufficiently satisfied (Luhmann & Hawkley, 2016; Peplau & Perlman, 1982). Loneliness has long been considered an important research topic in psychology, but existing longitudinal studies on loneliness are generally limited to specific age periods, with very few studies using long-term, large-scale longitudinal studies to track development across several developmental periods (Mund, Freuding, Möbius, Horn, & Neyer, 2020). The adolescent and young adult years are of particular interest for loneliness research because these periods encompass a large variety of sociodemographic, family, social, and personality challenges for young people (Arnett, 2000), which in turn may have considerable impact on how loneliness develops. To address some of the key open questions in this area, we use data from a large-scale longitudinal study that tracks how loneliness develops from ages 13 to 31. Our study will also shed new light on pivotal questions revolving around central predictors of loneliness trajectories across the adolescent and young adulthood years and on how such trajectories foreshadow subsequent important midlife outcomes.

Definition and Measurement of Loneliness

Loneliness is commonly defined as a response to a perceived discrepancy between the desired quantity and quality of social life and actual social relationships, and definitions emphasize that loneliness is the subjective experience of being socially isolated, in contrast to being alone (Luhmann & Hawkley, 2016; Peplau & Perlman, 1982). Researchers differentiate between two main approaches to assess loneliness; direct and indirect approaches. A direct

approach asks openly about the frequency of feelings of loneliness, including the term "loneliness" or "lonely" in the question to assess the construct. Direct measures of loneliness have been shown to have good face validity and predictive utility (von Soest, Luhmann, Hansen, & Gerstorf, 2020), but they have been criticized because people may not always admit to feeling lonely due to the social stigma attached to loneliness (de Jong Gierveld, van Tilburg, & Dykstra, 2016). In contrast, indirect approaches assess loneliness using multiple-item scales that avoid using the term "loneliness". Indirect measures are thought to reduce social desirability biases, and the use of multiple items increases the reliability of such measures. However, some researchers have questioned whether indirect loneliness scales in fact capture the genuinely personal experience of loneliness (de Jong Gierveld et al., 2016; Jylhä & Saarenheimo, 2010).

Another debate in loneliness research concerns how loneliness should be conceptualized. Most empirical studies assess loneliness as a homogeneous construct, but the multifaceted nature of loneliness has long been emphasized (Hawkley, Browne, & Cacioppo, 2005). An influential conceptualization of the nature of loneliness proposed by Weiss (1973) differentiates between emotional and social facets of loneliness. Emotional loneliness originates in the absence of close emotional attachments and deep and meaningful relationships. Social loneliness originates in the absence of a broader accessible social network of friends, colleagues, and supportive neighbors. The present study aims to provide a comprehensive and multidimensional picture by using a direct measure of loneliness as well as indirect measures that differentiate between emotional and social facets of loneliness.

Development of Loneliness Across Adolescence and Young Adulthood

Adolescence and young adulthood are considered as periods of life with a variety of social, cognitive, biological, and demographic changes that may influence loneliness. In

particular, adolescence involves an important restructuring of social life, with rising importance

of peers and first romantic experiences, whereas time spent with parents and warmth and

cohesion in the adolescent-parent relationship diminish gradually (Smetana, Campione-Barr, &

Metzger, 2006). Young adulthood is a time when new social relationships are formed, and the

young adulthood years are considered to be a period of substantial change and diversity (Arnett,

2000). Adolescence and young adulthood may be associated with increased loneliness levels

because people in these years typically lack the daily companionship of either their family of

origin or their family to be (Arnett, 2000). In contrast, steadily increasing global social networks

(Wrzus, Hanel, Wagner, & Neyer, 2013) may counteract feelings of loneliness during

adolescence and young.

Empirical data on age trends in loneliness in the second and third decades of life provide

an incomplete picture. A recent meta-analysis of longitudinal studies showed that mean levels of

loneliness were rather stable across adolescence, young adulthood, and midlife (ages 12 to 40;

Mund et al., 2020). However, conclusions drawn from this study remain uncertain because the

majority of research among adolescents assessed loneliness in specific domains such as peer-

related loneliness (Vanhalst, Goossens, Luyckx, Scholte, & Engels, 2013) or loneliness in school

(Ladd & Ettekal, 2013), and results on age trends beyond adolescence were based on few studies.

Large-scale longitudinal studies covering the adolescent and young adulthood years are

needed to provide a more comprehensive picture on the development of loneliness across these

periods of life. Moreover, studies taking the multidimensional nature of loneliness into account

by assessing different aspects of loneliness simultaneously are particularly sparse (Mund et al.,

2020). The present study addresses the limited knowledge by using longitudinal data covering

the whole adolescent and young adult period and by assessing different facets of loneliness. We

propose that different facets of loneliness may develop differently. In particular, social loneliness may abate during adolescence and young adulthood because of increasing social networks. In contrast, emotional loneliness may not decrease or even increase because close emotional relationships with parents and other family members are gradually weakening while relationships to close peers and romantic partners tend to be volatile (Arnett, 2000).

Predictors of Loneliness Trajectories Across Adolescence and Young Adulthood

Previous research has provided important knowledge about predictors of loneliness in childhood and adolescence (Weeks & Asher, 2012). However, research on factors that predict loneliness beyond the adolescent years into adulthood is sparse. The second aim of this study is therefore to examine how a wide array of potential predictors of loneliness are related to both level of and change in loneliness across adolescence and young adulthood. Theoretical accounts have identified four sets of variables as possible sources of loneliness, including (a) sociodemographic variables and parental characteristics, (b) family and social relationship characteristics, (c) social transitions, and (d) personality (Peplau & Perlman, 1982; Schinka, van Dulmen, Mata, Bossarte, & Swahn, 2013).

Sociodemographic variables and parental characteristics. Empirical findings on the role of gender for loneliness among young people is mixed, with some studies reporting more loneliness among young women, others reporting more loneliness among young men, and yet other studies not finding significant gender differences (Schinka et al., 2013; Weeks & Asher, 2012). This variation across studies has long been proposed to result from differences in how loneliness is assessed (Borys & Perlman, 1985). More specifically, when direct measures of loneliness are used, men may underreport feeling lonely because disclosing loneliness has been hypothesized to be less socially acceptable for men than for women. In contrast, for indirect

measures of loneliness, no such differences are expected because such measures assess to a lesser degree socially undesirable experiences (Borys & Perlman, 1985). In line with this view, a review of studies of mainly adolescent and young adult samples showed that direct measures revealed young women to report feeling more lonely than young men, whereas indirect measures revealed no gender differences or even higher levels of loneliness among men (Borys & Perlman, 1985). However, another review suggests that the available evidence in general does not support the notion of gender differences in loneliness among children and adolescents (Weeks & Asher, 2012). Possibly, gender differences may also vary by the domains of loneliness considered. For example, in a study on 10- to 11-year-old children (Junttila & Vauras, 2009), boys showed higher emotional loneliness than girls, but no differences were found for social loneliness. The present study will examine these questions further by investigating gender differences in trajectories for several different measures of loneliness.

Parental characteristics are another set of potentially relevant factors for loneliness. To begin with, parental economic resources may be of importance: Young people in affluent homes will have the financial means to participate in organized activities that facilitate social interactions with peers, whereas young people from poor families may have fewer opportunities to do so. Results from the few studies available show that measures of socioeconomic status, such as low family income (Schinka et al., 2013) and low social class based on parent's occupation (Madsen et al., 2018) are each related to higher levels of loneliness among adolescents. It is unclear though whether such associations diminish with children's age because children often become increasingly more financially independent from their parents. It is also an open question whether parental socioeconomic status is particularly relevant for specific aspects of loneliness but less so for others.

Experiencing parental divorce may also be important for loneliness because such factors may profoundly influence the child's social environment. Research on well-being corroborates this notion by showing that adults and children from divorced families report on average lower well-being than their counterparts in married-couple families (Amato, 2010). However, empirical research on how family structure is related to loneliness is scarce, and a study on Finnish adolescents did not find significant associations between family structure and loneliness (Rönkä, Rautio, Koiranen, Sunnari, & Taanila, 2014).

Family and social relationships. Parents, as primary caregivers, may be particularly important sources of their children's loneliness. Especially in early adolescence, the quality of the parent-child relationship may directly influence feelings of loneliness because young people in this age group consider their parents as a major provider of social support (Furman & Buhrmester, 1992). In later adolescence and young adulthood, when same-sex peers and romantic partners gradually become primary sources of social support, characteristics of the parent-child relationship may continue to be important for feelings of loneliness because the relationship formed between the child and his or her parents is assumed to influence the child's capacity to form later social and intimate bonds (Bartholomew, 1990). However, there is a lack of longitudinal studies on how perceived quality of parental relationship is related to trajectories of loneliness across adolescence and young adulthood.

Also, siblings may influence loneliness, because siblings may provide emotional and practical support that protects against loneliness. However, a study among adolescents found no association between having a sibling and reports of loneliness (Rönkä et al., 2014).

Peer relationships become more and more important with increasing age and are considered to be the most central source of individual variation in loneliness in adolescence and

young adulthood (Furman & Buhrmester, 1992). Generally, there is agreement in the literature that high quality friendships are an important resource against loneliness (Weeks & Asher, 2012). For this reason, examining how close friendship—instead of the quantity of social relations—is related to trajectories of loneliness will be a focus of the present study.

Social transitions. Theoretical accounts have long proposed that major social transitions in a person's life are a particularly important source for individual differences in loneliness (Peplau & Perlman, 1982). The period of adolescence and young adulthood encompasses several of such major transitions, including moving out of the parental home, establishing a living together relationship with a spouse or partner, and becoming a parent. Indeed, research has shown that such transitional changes have an impact on characteristics of people's social networks (Wrzus et al., 2013), which in turn may influence loneliness. However, the effect of social transitions on both network size and loneliness may vary profoundly according to the timing of such life events. An age-normative life stage perspective would predict that social transitions are particularly important in reducing feelings of loneliness when such transitions occur at an age when they are considered appropriate. For example, cross-sectional research indicates that living together as a couple is more strongly associated with low levels of loneliness among persons in midlife than in younger years, presumably because living together as a couple is most common among middle-aged adults (Luhmann & Hawkley, 2016).

Likewise, even though studies have shown that parenthood generally is related to a reduced social network (Wrzus et al., 2013), becoming a parent may be particularly detrimental for loneliness among young parents because early parenthood has become rare and is often considered undesirable. In a similar vein, leaving family and friends to start college in a different town has been reported to be an important reason for loneliness in the transition to college

(Cutrona, 1982). However, those who leave the parental home even earlier (e.g., during senior high school) may report even more profound and longer lasting loneliness.

In summary, the effect of important transitions on loneliness may to some degree be a matter of timing: When such transitions occur during a normative period, these may not boost loneliness. However, we acknowledge that the timing of important transitions into adulthood has become more heterogeneous from the 1950s and thereafter in most Western countries, including Scandinavia and the US (Elzinga & Liefbroer, 2007). Timing effects may thus be smaller in a cohort from the 1970s—from which our study sample is drawn—than in earlier cohorts with more homogeneous life histories in adolescence and early adulthood.

Personality: Agency and communion orientation. Even though personality has been considered to be an important source of variations in loneliness, studies focusing directly on personality and loneliness are rare (Mund & Neyer, 2016). In the present study, we focus on the personality traits of agency and communion, which reflect two basic dimensions of interpersonal behavior and are considered to serve as conceptual coordinates for socially relevant personality traits (Wiggins, 1991). Communion, as manifested in striving for intimacy and solidarity, may be an important predictor of low levels of loneliness due to its prosocial nature. Agency, as manifested in strivings for mastery and power (Wiggins, 1991), may also be associated with low levels of loneliness, because agency is related to proactive behavior in social settings that may counteract loneliness. Few empirical studies have examined associations between these personality traits and loneliness directly, and the one cross-sectional study available among young adults showed that both communion and agency were indeed related to lower levels of loneliness (Zarbatany, Conley, & Pepper, 2004). To our knowledge, only one study has used longitudinal data to examine how personality variables comparable to agency and communion

are related to loneliness (Mund & Neyer, 2016); in that study, neither extraversion nor

agreeableness (personality traits that are conceptually related to agency and communion,

respectively; McCrae & John, 1992) were predictive of changes in loneliness. Due to the scarcity

of research, we know little about how broad personality traits are related to trajectories of

loneliness from adolescence to young adulthood.

Linking Loneliness Trajectories in Adolescence and Young Adulthood to Midlife Outcomes

        A third aim of our study is to examine the importance of loneliness trajectories across

adolescence and young adulthood for later midlife outcomes. Extensive research has shown

loneliness to be a risk factor for poor mental and physical health and increased mortality hazards

(Hawkley & Capitanio, 2015; Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015).

However, research on consequences of loneliness in other domains in life such as education and

work is scarce. We assume that adolescent loneliness may be related to educational careers and

labor market integration in midlife because longitudinal and experimental studies indicate that

loneliness is a source of declines in cognitive functioning and poor self-regulation (Cacioppo &

Hawkley, 2009), which in turn may impede academic and professional careers. Loneliness in

young people may thus influence later educational and occupational careers by lowering

cognitive functioning, self-efficacy beliefs, and academic achievements.

        Targeting two major health outcomes, we will also examine whether and how loneliness

trajectories across adolescence and young adulthood prospectively predict in midlife the onset of

disability and the prescription of antidepressants. The extensive body of research linking

loneliness with poor physical health is primarily based on older age groups (Hawkley &

Capitanio, 2015). The present study will examine such associations in adolescence and young

adulthood using register-based indicators of disability. For mental health, studies have found that

loneliness is a longitudinal predictor of higher depressive symptoms among both adolescents (Koenig & Abrams, 1999) and adults (Lim, Rodebaugh, Zyphur, & Gleeson, 2016). We note that the available studies used self-reports of both loneliness and depressive symptoms, which may be biased through shared method variance. Moreover, studies examining the importance of both level of loneliness and change in loneliness for later outcomes are lacking entirely.

The Present Study

In this study, we examine (a) the development of loneliness across adolescence and young adulthood; (b) how potential predictors in the domains of sociodemographic variables and parental characteristics, family and social relationships, social transitions, and personality are related to loneliness trajectories; and (c) how loneliness trajectories across the adolescent and young adulthood years prospectively predict later midlife outcomes in the domains of education, work, and health. To do so, we apply growth curve models by utilizing data from a large-scale longitudinal study of Norwegian adolescents and young adults covering the age span 13 to 31 years. Our report is the first longitudinal study on loneliness to cover the whole adolescent and young adult age range. Moreover, we aim to move the field forward by targeting different facets of loneliness (direct measures and indirect measures of emotional and social loneliness) and by using register data that reliably assess later important midlife outcomes. We expect levels of loneliness to increase when using direct measures and when assessing emotional aspects of loneliness because close emotional relationships tend to be volatile in adolescence and young adulthood, whereas social loneliness may decrease because social networks gradually increase with age. We expect that several sociodemographic and parental characteristics (gender, parental education, parental unemployment and disability, living with both biological parents), family and social relationships (parental care, sibling relationships, friendships), social transitions (leaving

the parental home, living together as a couple, being a parent), and personality (communion and agency) will predict trajectories of loneliness. Finally, we expect to find that level and change in loneliness predict adverse midlife outcomes in educational and occupational careers (education, income, unemployment) and health (disability, prescriptions of antidepressants).

Methods

Procedure and Participants

Questionnaire data were derived from the Young in Norway Study collected at four time points: 1992 (T1), 1994 (T2), 1999 (T3), and 2005 (T4). These self-reports were linked to register data from the Norwegian Prescription Database and time series data from Statistics Norway. The use of the nationwide unique personal identification number for each resident allows linking data from Norwegian administrative registers with high accuracy. Due to regular quality checks and high standards in maintaining the administrative registers, information from such registers is considered highly reliable, with only exceptional cases of missing data or erroneous coding (Lyngstad & Skardhamar, 2011). The initial sample at T1 was drawn from 67 representative junior and senior high schools in Norway, with a response rate of 97%. Students were mainly born between 1974 and 1979 and were 13 to 18 years of age at T1 and 27 to 31 years of age at T4. At the first follow up at T2, approximately half of the students had completed the 3-year track at the junior or senior high school and thus left the school they had been attending at T1. Only students who had completed the questionnaires at school at T2 were followed up at T3 and T4. Response rates among students eligible for participation were 92%, 84%, and 82% at T2, T3, and T4, respectively. At T4, the respondents were asked for their consent to link the data to several registers, to which 2,602 respondents (90%) agreed. The overall participation rate of the final sample, based on all eligible students at T1 who still were at

their original school at T2, was 68% at T3, 67% at T4, and 60% concerning assessment of

register data. Only data from students born between 1974 and 1979 and who had participated in

the study at least at one time point in young adulthood (i.e., T3 or T4) were included in the

present study ($N = 3,116$). The study was approved by the Regional Committee for Medical

Research Ethics (reference no.: S-05030; project name: "Young in Norway").

Attrition analysis showed that a high level of social loneliness at T1 ($OR = 1.22$; 95% CI:

$1.10 – 1.35$; $p < .001$) significantly predicted attrition, whereas emotional loneliness ($p = .526$)

and the direct measure of loneliness did not ($p = .421$). Moreover, older age ($OR = 1.26$; 95% CI:

$1.21 – 1.31$; $p < .001$), male gender ($OR = 1.36$; 95% CI: $1.20 – 1.53$; $p < .001$), low parental

education ($OR = 0.91$; 95% CI: $0.86 – 0.96$; $p < .001$), not growing up with both biological

parents ($OR = 0.85$; 95% CI: $0.75 – 0.96$; $p = .009$), low scores on parental care ($OR = 0.80$; 95%

CI: $0.72 - 0.89$; $p < .001$), and high levels of agency ($OR = 1.13$; 95% CI: $1.02 – 1.26$; $p = .019$)

were significantly related to drop-out.

Measures

Loneliness. As a direct measure of loneliness, participants were at all four time points

asked to respond to the single item "I feel lonely," with response options *never* (1), *rarely* (2),

sometimes (3), and *often* (4). This measure has been used in a number of studies and has

generally been shown to have good face and predictive validity (von Soest et al., 2020).

However, direct measures have been criticized because they consist of a single item and have

therefore lower reliability than indirect measures using multiple items (de Jong Gierveld et al.,

2016). As an indirect measure of loneliness, we used a four-item short version of the 20-item

UCLA Loneliness Scale (Russel, Peplau, & Cutrona, 1980). The short version was derived by

using optimal subset regression procedures, and Russel et al. (1980) suggested its use for

research purposes when short measures of loneliness are needed. Even though initial studies

provided support for favorable psychometric characteristics of the short version, with good

internal consistency estimates and high correlations with the full UCLA Loneliness Scale (Russel

et al., 1980), subsequent studies of the full UCLA Loneliness Scale have indicated that the scale

is multifactorial, consisting of a factor measuring emotional loneliness and one or more factors

measuring aspects of social loneliness (Hawkley et al., 2005). The short version used in this

study consists of two items assessing emotional loneliness ("No one really knows me well";

"People are around me but not with me") and another two items assessing social loneliness ("I

can find companionship when I want it"; "I feel in tune with people around me"). Items

assessing social loneliness were reverse-coded, with higher scores of items indicating high levels

of loneliness. In a series of preliminary confirmatory factor analyses, we corroborated the two-

factor structure of the scale and its measurement invariance across time (for details, see the

Online Supplemental Material). Correlations between the two emotional loneliness items ranged

from $r = .56$ and $r = .61$ across T1 to T4, with Spearman-Brown reliability coefficients ranging

from .71 to .76. For social loneliness, correlations ranged from $r = .35$ to $r = .46$ with reliability

coefficients ranging from .52 to .63. See the Online Supplementary Material for a further

examination of the reliability of the loneliness items.

Sociodemographic variables and parental characteristics. Respondents' gender was

assessed by self-report at T1. To index parental characteristics, we used national register data

from Statistics Norway on parental education level for the parent with the highest education

when the respondent was 16 years old, ranging from 1 (*junior high school or lower education*) to

4 (*higher university degree*). Self-reports at T1 were obtained for whether one or both parents

were unemployed and/or received a disability pension and for whether the respondents were

living with both biological parents.

Family and social relationships. Parenting practices and parental care towards the respondent were measured at T1 using the 5-item Care subscale of a revised version of the Parental Bonding Instrument (Parker, Tupling, & Brown, 1979). Internal consistency was .73. We used self-reported information on whether the respondent had siblings. Respondents were also asked at T1 to answer the question "Do you have a close friend?", distinguishing between respondents who reported having no close friends and those with one or more friends.

Social transitions. Respondents were asked at T4 whether they had moved out of the parental home and at what age. We grouped the respondents into those who had moved out at age 17 or earlier (i.e., before Norwegian students typically finish senior high school), those who had moved at age 18 or later, and those who had never moved out of the parental home. Moreover, respondents provided information about whether they had ever lived together with a spouse or partner, and at what age they first moved together. We grouped respondents into those living together with a spouse or partner at age 25 or earlier, those who lived together for the first time with a spouse or partner at age 26 or later, and those who had never lived together as a married or unmarried couple. Finally, using self-reports on whether respondents had become parents by age 31, we grouped respondents into three groups: those who became parents at age 24 or earlier (who can be considered young parents according to Norwegian census data, because only 19% of 24-year-olds have become parents), those who for the first time became parents at age 25 or later, and those who did not became parents in the study period.

Personality: Agency and communion orientation. Communion (i.e., interpersonal orientation, expressiveness) and agency (i.e., self-assertiveness, instrumentality) were assessed at T1 using a short version of the Bem Sex-Role Inventory (Bem, 1974) that has been shown to

reliably assess agency and communion (Hoffman & Borders, 2001). Some of the items from the scale were not assessed, because they were difficult to translate into Norwegian. We therefore used only nine of ten items assessing agency (the item "assertive" was not assessed) and seven of ten items assessing communion (the items "compassionate", "affectionate", and "tender" were not assessed). Internal consistency was .75 for agency and .80 for communion.

Midlife outcomes. National register data were used to obtain information about respondents' highest level of education at age 35, with categories ranging from 1 (junior high school) to 5 (higher university degree). Register data were used to compute mean annual income from age 32 to age 35. Income was then recoded into 10 equally sized groups ranging between 0 (lowest income) and 1 (highest income). Moreover, a dummy variable was constructed to indicate whether respondents had received social or unemployment benefits when they were between 32 and 35 years of age. We also obtained register data about whether respondents had been prescribed antidepressants at least once when they were between 32 and 35 years old.

Covariates. In our analyses predicting midlife outcomes, we used three covariates that may confound associations between loneliness and outcomes. First, we controlled for gender because loneliness and outcomes such as education and antidepressant use often differ between men and women (Hyde, 2014; Weeks & Asher, 2012). Second, we controlled for academic achievements because these may be highly predictive of future education and labor market outcomes (Caspi, Wright, Moffitt, & Silva, 1998). Academic achievement were assessed by averaging grades at T2 across the school subjects Norwegian, English, and mathematics. Third, parental education when respondents were 16 years old was used as a proxy of socio-economic status because parental socio-economic position often shapes children's loneliness and future education and labor market outcomes (Caspi et al., 1998; Madsen et al., 2018).

Statistical Analyses

For the direct measure of loneliness, latent growth models were constructed based on the manifest loneliness item. For emotional and social loneliness, models were based on latent loneliness factors at T1 to T4 with strong metric invariance (Little, Card, Sledgers, & Ledford, 2007) and scaled by means of the effects coding method of scaling (Little et al., 2007) that preserves the metric of the observed loneliness indicators. As a consequence, the factor loadings for emotional loneliness were 1.02 and 0.98 for "No one really knows me well" and "People are around me but not with me", respectively, whereas factor loadings for social loneliness were 0.85 and 1.15 for "I can find companionship when I want it" and "I feel in tune with people around me", respectively.

Next, cohort-sequential latent growth models were constructed using multiple group analysis with cohorts defined by birth years (1974 to 1979; for details see the Online Supplemental Material). Factor loadings for growth factors were parameterized using the individual's age, such that a common growth trajectory for loneliness across all birth cohorts was estimated representing development of loneliness from age 13 to age 31. Residual variances at each age were freely estimated. Following usual practice, missing data were accommodated using full information robust maximum likelihood estimation procedures (Lang & Little, 2018). For probit models, a robust weighted least squares estimation procedure was employed, where missing data were handled by a procedure based on pairwise present analysis. Because respondents were recruited from 67 different schools, potential non-independence of observations due to school clusters was addressed by estimating parameters by maximizing a weighted log-likelihood function, whereas standard error estimations were performed with a sandwich estimator. Model fit was evaluated by inspecting χ^2 statistics, the comparative fit index

(CFI), the Tucker–Lewis index (TLI), and the root mean square error of approximation

(RMSEA). According to recommendations in the literature, CFI and TLI values of .95 or greater

and RMSEA values of .06 or lower were considered as indicating good fit (Hu & Bentler, 1999).

Mplus Version 7.3 was used for all analyses.

Results

Table 1 presents descriptive statistics and intercorrelations of the study variables. The

table shows increased levels of the direct measure of loneliness and emotional loneliness from

T1 to T3, whereas levels of social loneliness decreased. The rather strong decrease in social

loneliness was also indicated by a considerable negative correlation between social loneliness

and age ($r = -.31$). Cross-sectional correlations between the direct loneliness measure and

emotional loneliness were rather stable across time points, with correlations between $r = .57$ and

$r = .61$. Of note, correlations between the direct loneliness measure and social loneliness

increased gradually across time from $r = .17$ at T1 to $r = .40$ at T4. Likewise, the correlation

between emotional and social loneliness increased from $r = .14$ to $r = .48$ from T1 to T4. Rank

order stability across adjacent time points was rather similar across both time points and

loneliness measures, with correlations ranging from $r = .30$ to $r = .48$.

Development of Loneliness Across Adolescence and Young Adulthood

When comparing linear growth curve models with quadratic growth curve models, the

latter described loneliness trajectories more adequately (for details, see the Online Supplemental

Material). Table 2 shows the model fit for the quadratic growth curves for the direct and

emotional loneliness measure to be adequate, whereas model fit was somewhat low for some

indices for social loneliness. The table also presents growth parameters of loneliness trajectories

where the intercept represented the estimated level of loneliness at age 13. Moreover, by varying

the coding of time, we also provide estimates of levels of loneliness at age 31, as expressed by

intercepts in re-parameterized growth curves. Figure 1 is a graphical representation of the

loneliness trajectories. As the figure shows, the direct measure of loneliness and emotionally

loneliness showed similar developments, with gradual increases from age 13 to the mid-20s and

slight declines from thereon to age 31. In contrast, social loneliness declined from age 13 to the

mid-20s and leveled out thereafter. Cohen's d estimates of the change between ages 13 and 31

showed the effects size of the increase in the direct measure of loneliness to be small ($d = 0.20$)

and even smaller when assessing emotional loneliness ($d = 0.06$). In contrast, the estimated

decline in social loneliness from age 13 to age 31 showed a large effect size ($d = 0.75$).

Predictors of Loneliness Trajectories Across Adolescence and Young Adulthood

In a next step, sociodemographics were included as time-invariant predictors (Table 3).

Gender was significantly related to the intercept but not to the linear or quadratic slopes of all

three loneliness measures. More specifically, as Figure 2 shows, women reported overall higher

levels of loneliness than men for both the direct loneliness measure and emotional loneliness,

whereas men reported higher levels of social loneliness. These gender differences remained

constant across age for the direct measure of loneliness and social loneliness and disappeared for

emotional loneliness when people approached age 31. Low parental education was related to

higher initial social loneliness scores, an association that also diminished with age. Having

parents who received benefits for unemployment or disability was related to higher initial levels

of emotional loneliness. Moreover, not living with both biological parents was not related to any

initial differences in loneliness, but not having lived with both biological parents was related to

higher levels of loneliness at age 31 for both direct measures of loneliness and social loneliness.

For relationship factors, low levels of parental care were consistently associated with

higher levels on all three measures of loneliness. For social loneliness, this difference

significantly decreased with age but remained significant at age 31 (see Figure 3, Panel A). We

also found sibling effects in that single children experienced a linear increase for the direct and

emotional loneliness measure, whereas children with siblings exhibited a reverse U-shape

development with highest reports of loneliness in their early 20s. Respondents with siblings

reported significantly lower loneliness scores at age 31 than single children. For social loneliness

in contrast, having siblings was associated with only minor differences (see Figure 3, Panel B).

Having at least one close friend was strongly related to low initial levels on all loneliness

measures, and with age these differences disappeared (see Figure 3, Panel C).

For social transitions, leaving the parental home at age 17 or earlier was associated with

higher levels of direct and emotional loneliness. Moreover, those still living at home at age 31

reported higher levels of social loneliness at age 13 than those who had moved out at age 18 or

later, and we also observed elevated levels on the direct measures of loneliness at age 31 (see

Figure 4, Panel A). Those who had never lived together with a spouse or partner reported higher

initial levels of social loneliness at age 13 and also higher levels at age 31 on the direct loneliness

measure compared to persons with a partner or spouse (see Figure 4, Panel B). Parenthood was

not related to initial level of loneliness, but trajectories diverged with those who became parents

at age 25 or later reporting lower levels of loneliness at age 31 on all loneliness measures than

both the young parents and those who did not become parents (see Figure 4, Panel C).

Finally, when examining personality traits, communion was related to lower levels of

emotional and social loneliness at all ages, whereas agency was related to low levels of

loneliness for all three measure at all ages.

Linking Loneliness Trajectories in Adolescence and Young Adulthood to Midlife Outcomes

To examine whether loneliness trajectories predicted important midlife outcomes, we regressed midlife indicators of educational and occupational careers and health on intercepts and growth factors of loneliness. For dichotomous dependent variables, probit regressions were modeled. Proportion of explained variance (R^2) for probit regressions were based on the underlying continuous latent response variable (McKelvey & Zavoina, 1975). Moreover, analyses were repeated with control for gender, school grades, and parental education.

As can be obtained from Table 4, adolescents and young adults who reported feeling lonely and/or increases in loneliness were consistently at higher risk for disability and lower income in midlife both with and without adjusting for covariates. Other important midlife outcomes including education, labor market inclusion, and prescriptions of antidepressants exhibited facet-specific associations. For example, the intercept and slope of the direct loneliness measure predicted higher midlife unemployment, whereas indirect measures were not predictive. In general, models tested in Tables 3 and 4 showed fit indices similar to the unconditional growth models for the three loneliness measures as reported in Table 2.

Discussion

In this study, developmental trajectories of key aspects of loneliness were examined in a large-scale, population-based long-term longitudinal study. When asking directly about feeling lonely and emotional facets of loneliness, loneliness was found to increase across the adolescent and young adulthood years, whereas social facets of loneliness decreased and plateaued when people had reached their mid-20s. Women reported higher levels of loneliness for direct assessments and emotional loneliness, whereas men reported higher levels when social loneliness was assessed. High levels of reported parental care, close friendship, and agency were each consistently related to more favorable trajectories of loneliness. Moreover, the timing of social

transitions (moving out from the parental home, marriage or cohabitation, becoming a parent)

predicted trajectories for some but not all aspects of loneliness. High and increasing trajectories

of loneliness were consistently related to disability and low income in midlife, even when

controlling for covariates. Primarily when measured directly, loneliness trajectories were also

related to other aspects of labor market inclusion and to prescription of antidepressants.

Loneliness Development Across Adolescence and Young Adulthood

Our study is among the first to demonstrate that emotional and social loneliness show

distinct developmental trends across adolescence and young adulthood, supporting the

multidimensional conceptualization of loneliness (Hawkley et al., 2015; Weiss, 1973). This

finding may provide an additional perspective on earlier diverging findings about the

development of loneliness in this age group. On the one hand, the moderate increase in

emotional loneliness is in accordance with the view that adolescence and young adulthood may

be a phase in life where social bonds are restructured and social and romantic relationships with

peers are increasing in importance, which may lead to feeling a greater emotional distance to

other people (Smetana et al., 2006). On the other hand, substantially decreasing levels of social

aspects of loneliness indicate that even though the adolescent years are emotionally challenging,

adolescents and young adults may experience an increase in the size of their extended social

network, a notion that is in line with research showing people's global social networks to

increase steadily during adolescence and young adulthood (Wrzus et al., 2013).

Results from a recent meta-analysis showing stable mean levels of overall loneliness in

adolescence (Mund et al., 2020) may also be interpreted in light of our findings: Possibly, mean-

level changes in loneliness across adolescence remained undetected because results from

available longitudinal data were pooled across studies with different loneliness measures. In

particular, several studies using loneliness measures of specific domains, assessing mainly social aspects of loneliness, such as peer-related loneliness (Vanhalst et al., 2013) and loneliness in school (Ladd & Ettekal, 2013) found decreasing loneliness trends across adolescents. In contrast, the few studies examining global measures of loneliness found rather stable (van den Eijnden, Vermulst, van Rooij, Scholte, & van de Mheen, 2014) or increasing (Davis & Franzoi, 1986) loneliness trends during adolescence. Moreover, the frequent use of global single items to assess loneliness directly may contribute to mixed findings because such measures may have low reliability. In sum, the results of this study indicate that differentiating between emotional and social aspects of loneliness is of key importance when examining the development of loneliness.

Developmental patterns for the direct measure of loneliness were similar to those for emotional loneliness, with an even more accentuated increase in loneliness, compared to emotional loneliness. Moreover, directly assessed loneliness was more strongly correlated with emotional loneliness than with social loneliness, particularly in adolescence. These findings indicate that when adolescents are asked directly about feelings of loneliness, they may interpret the question as covering mainly emotional and not social aspects of loneliness.

Predictors of Loneliness Trajectories across Adolescence and Young Adulthood

The present study is the first to provide detailed information about how a comprehensive number of correlates predict trajectories of loneliness across adolescence and young adulthood.

Sociodemographic variables and parental characteristics. The higher levels of loneliness among women than men when loneliness was directly assessed is in line with the notion that expressing feelings of loneliness may be less socially acceptable in men than in women (Borys & Perlman, 1985). The somewhat higher level of emotional loneliness among women may also be explained by the notion that expressing emotional weakness or distress may

be more acceptable for women than men. In contrast, social loneliness—with no connotations of

emotions connected to perceived social isolation—may be less shaped by gender differences in

reporting bias, which is in line with our finding that men report somewhat higher social

loneliness than women. However, of note, respondents reported in general less social loneliness

than emotional and directly measured loneliness at almost all ages. This finding may be in

conflict with the notion of higher acceptance of social loneliness, because one would then expect

higher scores on social loneliness items. The present study thus indicates that it is not only

important to differentiate between indirect and direct measures of loneliness, but also to consider

the kind of indirect measure used when examining gender differences. The cause of such

differential results has, however, to be examined in more detail in future studies.

Other sociodemographic and parental characteristics showed rather weak or non-

significant associations to loneliness. Interestingly, lower parental education was related to a

greater feeling of social loneliness in early adolescence, but such differences gradually declined

with increasing age. The results may indicate that parents with high socioeconomic status may to

a larger degree facilitate their children's participation in activities, which may increase their

social inclusion in a broader network. When children reach young adulthood, though, this kind of

support from parents may become less important. Finally, not growing up with both parents was

related to higher directly-measured loneliness and social loneliness at age 31, which may indicate

that parental support may be more difficult in these families.

Family and social relationships. Parental care was shown to be a rather strong predictor

of loneliness, with all three measures of loneliness showing considerably higher loneliness scores

for those reporting lower degrees of parental care. Moreover, the results also consistently showed

a gradual decline of the relationship between parental care and loneliness with increasing age,

even though the relationship remained significant at age 31. The results are in accordance with previous cross-sectional research showing that parental attachment and conflict with parents are related to loneliness in young adults (Feeney, 2006). New are the longitudinal findings that associations between parental care and loneliness decrease with advancing age. This result indicates that parents are particularly important at an early age as a major provider of social support (Furman & Buhrmester, 1992). Moreover, even when the children have reached young adulthood and when peers and romantic partners gradually become the primary sources of social support, the parental relationship may still be of importance for loneliness to some degree, either because attachment to parents influences the child's capacity to form later social and intimate bonds (Bartholomew, 1990), or because parents still provide important social support, thereby reducing loneliness particularly for children who have a good relationship with their parents.

Interestingly, having siblings seemed to be of importance for reduced directly-assessed loneliness and emotional loneliness of the respondents only in their late 20s. This finding is in line with a recent review of the sibling literature showing that even though siblings spend less time with each other in the transition from adolescence to adulthood, sibling conflicts decrease, and intimacy among siblings may increase during this transition (Lindell & Campione-Barr, 2017). Our study adds to the existing knowledge base by supporting findings that having siblings may not be related to loneliness in adolescents (Rönkä et al., 2014). However, positive effects of having siblings may become visible in later periods of life.

Finally, not surprisingly, not having any close friends in adolescence was related to comparably high loneliness. Moreover, the association between adolescent friendship and loneliness declined with age into insignificance at age 31 for all measures. The results as such emphasize the importance of peers for loneliness; however, they do not indicate that having no

close friendships at one time point in adolescence necessarily has long-lasting effects.

Social transitions. When examining social transitions and their association with loneliness, the results to some degree support an age-normative life-stage perspective. Particularly for the direct measure of loneliness, non-normative transitional timing was related to developmental trajectories with higher levels of loneliness compared to normative timing. For example, compared to persons who moved out of the parental home between age 18 and 31, those who moved out at age 17 or earlier reported higher loneliness across all ages, whereas those who never left the parental homes showed significantly higher loneliness at age 31 but not at age 13. Similar patterns were shown for cohabitation and for parenthood, where normative transitional timing showed more favorable developmental loneliness trends, particularly for the direct measure of loneliness. Our study is the first to show how loneliness trajectories vary by the timing of social transitions in adolescence and young adulthood, and support the notion that age-normative social transitions are related to lower feelings of loneliness.

Agency and communion orientation. Reporting higher agency and communion was consistently found to be associated with lower levels of loneliness, with the exception of the direct loneliness measures for communion. The results thus indicate that personality characteristics that facilitate social interactions and social responsiveness are indeed related to lower levels of loneliness. Even though associations between loneliness levels and communion and agency decreased somewhat with increasing age, the results also show that adolescent personality is a source of long-term differences in loneliness. Results are in accordance with a cross-sectional study showing that both communion and agency were related to lower levels of loneliness (Zarbatany et al., 2004). The results are also in line with empirical research on similar personality constructs of social relevance, such as agreeableness and extraversion, where similar

cross-sectional relationships with loneliness were found (Buecker, Maes, Denissen, & Luhmann, 2020).

Linking Loneliness Trajectories in Adolescence and Young Adulthood to Midlife Outcomes

The present study provides new knowledge on how loneliness is related to midlife outcomes by showing that low levels of and decreases in loneliness were consistently related to higher income in midlife for all measures of loneliness, even after controlling for relevant covariates. Lonely adolescents and young adults probably struggle to establish sustainable social relationships and may therefore also have difficulty building networks in the occupational domain, which may lead to less successful careers and lower income. With its longitudinal design, this study is one of the first to show that loneliness prospectively predicts income.

The results also provide support for an association between loneliness levels and changes in loneliness and midlife markers of disability for most loneliness measures. These results are in line with research showing loneliness to be a risk factor for poor physical health and increased mortality hazards (Hawkley & Capitanio, 2015; Holt-Lunstad et al., 2015).

Interestingly, unemployment and prescription of antidepressants were predicted only by the direct measure of loneliness. It may be possible that direct measures of loneliness are related to some adverse outcomes to a greater degree than indirect measures because people may—due to the social stigma attached to loneliness—only openly acknowledge feeling lonely when they consider loneliness to be a substantial problem. The results of our study provide first indications that direct measures of loneliness may be especially potent predictors of future mental health problems. However, these findings have to be corroborated by future studies. Particularly, the link between loneliness and indicators of mental health problems (i.e., antidepressant prescriptions) may be underestimated in this study because a substantial proportion of the

population suffering from depression may not receive antidepressants, but instead receive other

forms for treatment or may not seek help (Skurtveit et al., 2018).

Strengths and Limitations

Several limitations of the present study have to be noted. First, even though the indirect

measure used in the present study is a short version of the widely used UCLA Loneliness Scale,

the use of just two items to assess emotional and social aspect of loneliness, respectively, is a

major limitation. The inclusion of a longer version of the scale would have increased reliability

of the scale. Moreover, factor analyses of the whole UCLA Loneliness Scale have shown the

scale to consist of three subscales, including emotional loneliness and two aspects of social

loneliness (Hawkley et al., 2005), whereas the present measure does not provide the possibility

to distinguish between two aspects of social loneliness. We also note that others have argued that

the UCLA Loneliness Scale represents a global loneliness factor and that more complex factor

structures result from differences in item wording in that the scale contains both reversed-worded

items (i.e., affirmative responses indicate low levels of loneliness) and non-reversed items (i.e.,

affirmative responses indicate high levels of loneliness; Russell, 1996). Unfortunately, also in

our study, item wording varied, where the two items covering emotional loneliness were

negatively worded, whereas the social loneliness items were positively worded. Even though we

conducted supplementary analyses to examine the issue of wording effects (see the Online

Supplementary Material), this study is limited by differences in item wordings. The generally

low reliability of single indicators is a limitation when using the direct measure of loneliness.

However, we are not aware of any widely used multi-item scale measuring loneliness directly.

Second, some of the findings of this study may be specific to the culture and the

historical time. For example, persons in Northern European countries (including Norway) report

lower levels of loneliness than those in Southern and particularly Eastern Europe (Hansen & Slagsvold, 2016). Such findings may indicate that trajectories and correlates of loneliness differ by economic and cultural circumstances. Likewise, the participants in the present study were born in the mid- to late 1970s, and factors that may have affected their developmental patterns of loneliness may differ from the factors for earlier or later generations. In particular, the emergence of social media may substantially influence developmental trajectories of loneliness in later-born cohorts (Nowland, Necka, & Cacioppo, 2017). Our results therefore have to be corroborated and tested for generalizability in other cultural and historical contexts.

Third, our research is limited by focusing on time-invariant predictors of loneliness trajectories, even though several of the predictors used are time-varying in nature. For example, it would have been valuable to examine how changes in friendships and in agency and communion were longitudinally related to loneliness. However, such concepts were not assessed in identical ways at all data collection waves. We also acknowledge that associations between timing of social transitions and loneliness trajectories should not be interpreted causally because initial levels of loneliness may shape social transitions whereas it is not possible that social transitions later in development causally influence prior levels of loneliness.

Fourth, even though potential midlife consequences were measured after the assessment of loneliness, no conclusions about causality can be drawn. Associations between loneliness trajectories and potential consequences may be due to covariates that were not assessed in this study. Finally, attrition analyses showed several variables at the first time point to be related to drop-out at later time points. Even though the study shows a high initial response rate and analyses were performed with missing data routines that have been recommended in the methodological literature (Lang & Little, 2018), selective attrition may to a certain degree

influence estimates of loneliness development and relationships between variables.

Conclusion

Our study is the first to provide a comprehensive picture of loneliness development throughout adolescence and young adulthood by using longitudinal data. The study highlights the multidimensionality of loneliness and provides empirical support for the notion that emotional and social aspects of loneliness have distinct developmental pathways. Moreover, this research shows that some factors—such as perceiving one's parents as caring, having a close friend, not having moved out of the parental home before age 18, and reporting more agency—consistently predicted key features of people's loneliness trajectories independently of how loneliness was assessed. In contrast, other predictors operated in facet-specific ways, which underlines the importance of examining different aspects of loneliness. A prominent factor in this respect was gender, where women reported more emotional loneliness than men at all ages, whereas men reported more social loneliness.

The present study points up the importance of examining loneliness development by using large-scale longitudinal studies covering several developmental periods. Such research designs have been utilized for other important psychological concepts, such as personality and self-esteem; however, longitudinal research on loneliness is generally limited to specific age periods (Mund et al., 2020). Our study moves one step forward by examining loneliness development throughout the whole adolescent and young adult periods, by examining several different aspects of loneliness and by examining both predictors and associations with midlife outcomes. Using large-scale longitudinal studies to replicate and extend our findings to other developmental periods will be of value for future research.

References

Amato, P. R. (2010). Research on divorce: Continuing trends and new developments. *Journal of Marriage and Family, 72*, 650-666. doi:10.1111/j.1741-3737.2010.00723.x

Arnett, J. J. (2000). Emerging adulthood. A theory of development from the late teens through the twenties. *American Psychologist, 55*, 469-480. doi:10.1037//0003-066X.55.5.469

Bartholomew, K. (1990). Avoidance of intimacy. An attachment perspective. *Journal of Social and Personal Relationships, 7*, 147-178. doi:10.1177/0265407590072001

Bem, S. L. (1974). The measurement of psychological androgyny. *Journal of Consulting and Clinical Psychology, 42*, 634-643.

Borys, S., & Perlman, D. (1985). Gender differences in loneliness. *Personality and Social Psychology Bulletin, 11*, 63-74. doi:10.1177/0146167285111006

Buecker, S., Maes, M., Denissen, J. J. A., & Luhmann, M. (2020). Loneliness and the big five personality traits: A meta-analysis. *European Journal of Personality, 34*, 8-28. doi:10.1002/per.2229

Cacioppo, J. T., & Hawkley, L. C. (2009). Perceived social isolation and cognition. *Trends in Cognitive Sciences, 13*, 447-454. doi:10.1016/j.tics.2009.06.005

Caspi, A., Wright, B. R. E., Moffitt, T. E., & Silva, P. A. (1998). Early failure in the labor market: Childhood and adolescent predictors of unemployment in the transition to adulthood. *American Sociological Review, 63*, 424-451. doi:10.2307/2657557

Cutrona, C. E. (1982). Transition to college: Loneliness and the process of social adjustment. In L. A. Peplau & D. Perlman (Eds.), *Loneliness: A sourcebook of current theory, research and therapy* (pp. 291-309). New York, NY: Wiley.

Davis, M. H., & Franzoi, S. L. (1986). Adolescent loneliness, self-disclosure, and private self-

consciousness: A longitudinal investigation. *Journal of Personality and Social Psychology, 51*, 595-608. doi:10.1037/0022-3514.51.3.595

de Jong Gierveld, J., van Tilburg, T., & Dykstra, P. A. (2016). Loneliness and social isolation. In A. Vangelisti & D. Perlman (Eds.), *Cambridge handbook of personal relationships* (2nd ed., pp. 485-400). Cambridge: Cambridge University Press.

Ebesutani, C., Drescher, C. F., Reise, S. P., Heiden, L., Hight, T. L., Damon, J. D., & Young, J. (2012). The importance of modeling method effects: Resolving the (uni)dimensionality of the loneliness questionnaire. *Journal of Personality Assessment, 94*, 186-195. doi:10.1080/00223891.2011.627967

Elzinga, C. H., & Liefbroer, A. C. (2007). De-standardization of family-life trajectories of young adults: A cross-national comparison using sequence analysis. *European Journal of Population, 23*, 225-250. doi:10.1007/s10680-007-9133-7

Feeney, J. A. (2006). Parental attachment and conflict behavior: Implications for offspring's attachment, loneliness, and relationship satisfaction. *Personal Relationships, 13*, 19-36. doi:10.1111/j.1475-6811.2006.00102.x

Furman, W., & Buhrmester, D. (1992). Age and sex differences in perceptions of networks of personal relationships. *Child Development, 63*, 103-115. doi:10.2307/1130905

Hansen, T., & Slagsvold, B. (2016). Late-life loneliness in 11 European countries: Results from the Generations and Gender Survey. *Social Indicators Research, 129*, 445-464. doi:10.1007/s11205-015-1111-6

Hawkley, L. C., Browne, M. W., & Cacioppo, J. T. (2005). How can I connect with thee? Let me count the ways. *Psychological Science, 16*, 798-804. doi:10.1111/j.1467-9280.2005.01617.x

Hawkley, L. C., & Capitanio, J. P. (2015). Perceived social isolation, evolutionary fitness and

    health outcomes: A lifespan approach. *Philosophical Transactions of the Royal Society B:*

    Biological Sciences, 370. doi:10.1098/rstb.2014.0114

Hoffman, R. M., & Borders, L. D. (2001). Twenty-five years after the Bem Sex-Role Inventory:

    A reassessment and new issues regarding classification variability. *Measurement and*

    Evaluation in Counseling and Development, 34, 39-55.

Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and

    social isolation as risk factors for mortality: A meta-analytic review. *Perspectives on*

    Psychological Science, 10, 227-237. doi:10.1177/1745691614568352

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis:

    Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.

    doi:10.1080/10705519909540118

Hyde, J. S. (2014). Gender similarities and differences. *Annual Review of Psychology, 65*, 373-

    398. doi:10.1146/annurev-psych-010213-115057

Junttila, N., & Vauras, M. (2009). Loneliness among school-aged children and their parents.

    Scandinavian Journal of Psychology, 50, 211-219. doi:10.1111/j.1467-9450.2009.00715.x

Jylhä, M., & Saarenheimo, M. (2010). Loneliness and ageing: Comparative perspectives. In D.

    Dennefer & C. Phillipson (Eds.), *The Sage handbook of social gerontology* (pp. 317-328).

    London, England: Sage.

Koenig, L. J., & Abrams, R. F. (1999). Adolescent loneliness and adjustment: A focus on gender

    differences. In K. J. Rotenberg & S. Hymel (Eds.), *Loneliness in childhood and adolescene*

    (pp. 296-322). Cambridge, England: Cambridge University Press.

Ladd, G. W., & Ettekal, I. (2013). Peer-related loneliness across early to late adolescence:

Normative trends, intra-individual trajectories, and links with depressive symptoms. *Journal of Adolescence, 36*, 1269-1282. doi:10.1016/j.adolescence.2013.05.004

Lang, K. M., & Little, T. D. (2018). Principled missing data treatments. *Prevention Science, 19*, 284-294. doi:10.1007/s11121-016-0644-5

Lim, M. H., Rodebaugh, T. L., Zyphur, M. J., & Gleeson, J. F. M. (2016). Loneliness over time: The crucial role of social anxiety. *Journal of Abnormal Psychology, 125*, 620-630. doi:10.1037/abn0000162

Lindell, A. K., & Campione-Barr, N. (2017). Continuity and change in the family system across the transition from adolescence to emerging adulthood. *Marriage & Family Review, 53*, 388-416. doi:10.1080/01494929.2016.1184212

Little, T. D., Card, N. A., Sledgers, D. W., & Ledford, E. C. (2007). Representing contextual effects in multiple-group MACS models. In T. D. Little, J. A. Bovaird & N. A. Card (Eds.), *Modeling contextual effects in longitudinal studies* (pp. 121-147). Mahwah, NJ: Erlbaum.

Luhmann, M., & Hawkley, L. C. (2016). Age differences in loneliness from late adolescence to oldest old age. *Developmental Psychology, 52*, 943-959. doi:10.1037/dev0000117

Lyngstad, T. H., & Skardhamar, T. (2011). Nordic register data and their untapped potential for criminological knowledge. *Crime and Justice, 40*, 613-645. doi:10.1086/658881

Madsen, K. R., Holstein, B. E., Damsgaard, M. T., Rayce, S. B., Jespersen, L. N., & Due, P. (2018). Trends in social inequality in loneliness among adolescents 1991–2014. *Journal of Public Health*, 1-8. doi:10.1093/pubmed/fdy133

McCrae, R. R., & John, O. P. (1992). An introduction to the 5-factor model and its applications. *Journal of Personality, 60*, 175-215. doi:10.1111/j.1467-6494.1992.tb00970.x

McKelvey, R. D., & Zavoina, W. (1975). A statistical model for the analysis of ordinal level

dependent variables. *Journal of Mathematical Sociology, 4*, 103-120.

doi:10.1080/0022250X.1975.9989847

Mund, M., Freuding, M. M., Möbius, K., Horn, N., & Neyer, F. J. (2020). The stability and

change of loneliness across the life span: A meta-analysis of longitudinal studies.

Personality and Social Psychology Review, 24, 24-52. doi:10.1177/1088868319850738

Mund, M., & Neyer, F. J. (2016). The winding paths of the lonesome cowboy: Evidence for

mutual influences between personality, subjective health, and loneliness. *Journal of

Personality, 84*, 646-657. doi:10.1111/jopy.12188

Nowland, R., Necka, E. A., & Cacioppo, J. T. (2017). Loneliness and social Internet use:

Pathways to reconnection in a digital world? *Perspectives on Psychological Science, 13*,

70-87. doi:10.1177/1745691617713052

Parker, G., Tupling, H., & Brown, L. B. (1979). A parental bonding instrument. *British Journal

of Medical Psychology, 52*, 1-10. doi:10.1111/j.2044-8341.1979.tb02487.x

Peplau, L. A., & Perlman, D. (1982). Perspectives on loneliness. In L. A. Peplau & D. Perlman

(Eds.), *Loneliness: A sourcebook of current theory, research and therapy* (pp. 1-18). New

York, NY: Wiley.

Preacher, K. J., Wichman, A. L., MacCallum, R. C., & Briggs, N. E. (2008). *Latent growth curve

modeling*. London, England: Sage.

Russel, D., Peplau, L. A., & Cutrona, C. E. (1980). The revised UCLA Loneliness Scale:

Concurrent and discriminant validity evidence. *Journal of Personality and Social

Psychology, 39*, 472-480. doi:10.1037//0022-3514.39.3.472

Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor

structure. *Journal of Personality Assessment, 66*, 20-40. doi:10.1207/s15327752jpa6601_2

Rönkä, A. R., Rautio, A., Koiranen, M., Sunnari, V., & Taanila, A. (2014). Experience of

loneliness among adolescent girls and boys: Northern Finland Birth Cohort 1986 Study.

Journal of Youth Studies, 17, 183-203. doi:10.1080/13676261.2013.805876

Schinka, K. C., van Dulmen, M. H. M., Mata, A. D., Bossarte, R., & Swahn, M. (2013).

Psychosocial predictors and outcomes of loneliness trajectories from childhood to early

adolescence. *Journal of Adolescence, 36*, 1251-1260.

doi:10.1016/j.adolescence.2013.08.002

Skurtveit, S., Bramness, J. G., Hjellvik, V., Hartz, I., Nesvåg, R., Hauge, L. J., & Handal, M.

(2018). Increase in diagnosis of depressive disorders contributes to the increase in

antidepressant use in adolescents. *Acta Psychiatrica Scandinavica, 137*, 413-421.

doi:10.1111/acps.12877

Smetana, J. G., Campione-Barr, N., & Metzger, A. (2006). Adolescent development in

interpersonal and societal contexts. *Annual Review of Psychology, 57*, 255-284.

doi:10.1146/annurev.psych.57.102904.190124

van den Eijnden, R., Vermulst, A., van Rooij, A. J., Scholte, R., & van de Mheen, D. (2014). The

bidirectional relationships between online victimization and psychosocial problems in

adolescents: A comparison with real-life victimization. *Journal of Youth and Adolescence,

43*, 790-802. doi:10.1007/s10964-013-0003-9

Vanhalst, J., Goossens, L., Luyckx, K., Scholte, R. H. J., & Engels, R. C. M. E. (2013). The

development of loneliness from mid- to late adolescence: Trajectory classes, personality

traits, and psychosocial functioning. *Journal of Adolescence, 36*, 1305-1312.

doi:10.1016/j.adolescence.2012.04.002

von Soest, T., Luhmann, M., Hansen, T., & Gerstorf, D. (2020). Development of loneliness in

midlife and old age: Its nature and correlates. *Journal of Personality and Social Psychology, 118*, 388-406. doi:10.1037/pspp0000219

Weeks, M. S., & Asher, S. R. (2012). Loneliness in childhood: Toward the next generation of assessment and research. *Advances in Child Development and Behavior, 42*, 1-39. doi:10.1016/B978-0-12-394388-0.00001-0

Weiss, R. S. (1973). *Loneliness: The experience of emotional and social isolation*. Cambridge, MA: MIT Press.

Widaman, K. F., Ferrer, E., & Conger, R. D. (2010). Factorial invariance within longitudinal structural equation models: Measuring the same construct across time. *Child Development Perspectives, 4*, 10-18. doi:10.1111/j.1750-8606.2009.00110.x

Wiggins, J. S. (1991). Agency and communion as conceptual coordinates for the understanding and measurement of interpersonal behavior *Thinking clearly about psychology: Essays in honor of Paul E. Meehl* (pp. 89-113). Minneapolis, MN: University of Minnesota Press.

Wrzus, C., Hanel, M., Wagner, J., & Neyer, F. J. (2013). Social network changes and life events across the life span: A meta-analysis. *Psychological Bulletin, 139*, 53-80. doi:10.1037/a0028601

Zarbatany, L., Conley, R., & Pepper, S. (2004). Personality and gender differences in friendship needs and experiences in preadolescence and young adulthood. *International Journal of Behavioral Development, 28*, 299-310. doi:10.1080/01650250344000514

Zhang, C., & Conrad, F. G. (2014). Speeding in web surveys: The tendency to answer very fast and its association with straightlining. *Survey Research Methods, 8*. doi:10.18148/srm/2014.v8i2.5453

Table 1

Descriptive Statistics for Variables Under Study

	M	SD	Skew-ness	Kur-tosis	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) Direct loneliness measure (T1)	1.99	0.87	0.48	-0.59																					
(2) Direct loneliness measure (T2)	2.00	0.86	0.43	-0.64	.47																				
(3) Direct loneliness measure (T3)	2.17	0.81	0.24	-0.50	.30	.37																			
(4) Direct loneliness measure (T4)	2.12	0.79	0.25	-0.49	.23	.31	.42																		
(5) Emotional loneliness (T1)	2.09	0.77	0.33	-0.52	.57	.40	.25	.21																	
(6) Emotional loneliness (T2)	2.12	0.79	0.22	-0.72	.41	.61	.32	.26	.48																
(7) Emotional loneliness (T3)	2.18	0.71	0.22	-0.32	.27	.37	.55	.33	.31	.42															
(8) Emotional loneliness (T4)	2.14	0.71	0.24	-0.29	.26	.31	.36	.56	.29	.34	.46														
(9) Social loneliness (T1)	1.59	0.65	1.18	1.25	.17	.13	.10	.13	.14	.13	.12	.13													
(10) Social loneliness (T2)	1.45	0.60	1.60	2.86	.19	.25	.14	.15	.16	.24	.16	.20	.47												
(11) Social loneliness (T3)	1.25	0.43	1.89	3.67	.17	.23	.36	.24	.19	.23	.43	.30	.24	.30											
(12) Social loneliness (T4)	1.25	0.42	1.87	3.57	.17	.23	.29	.40	.21	.26	.33	.48	.22	.30	.46										
(13) % women	54.1				.15	.14	.13	.12	.08	.07	.05	.03	-.08	-.04	-.07	-.05									
(14) Parental education	2.51	0.83	0.34	-0.56	.01	.02	.00	.02	.03	.04	.02	.01	-.15	-.13	-.08	-.03	-.02								
(15) % parental unemployment/disability	8.1				.05	.02	.05	.09	.06	.04	.02	.05	.00	.02	.03	.04	.01	-.13							
(16) % not living with both biological parents	31.3				.04	.03	.05	.10	.03	.02	.05	.06	.01	.04	.05	.08	.00	-.05	.11						
(17) Parental care	3.17	0.53	-0.51	0.24	-.16	-.16	-.15	-.13	-.20	-.21	-.16	-.18	-.17	-.18	-.13	-.16	.05	.10	-.07	-.07					
(18) % having siblings	94.5				-.06	.01	-.01	-.08	-.03	.01	.02	-.03	.03	.01	-.02	-.04	.01	.01	-.04	-.11	-.04				
(19) % having at least one close friend	98.0				-.16	-.13	-.06	-.02	-.16	-.12	-.08	-.07	-.12	-.13	-.11	-.08	.05	.00	-.01	-.03	.09	-.02			
(20) Communion	3.74	0.62	-0.27	0.00	-.01	-.03	-.03	-.03	-.08	-.11	-.10	-.09	-.13	-.14	-.13	-.16	.32	-.03	.01	.03	.20	.02	.07		
(21) Agency	3.34	0.60	-0.07	0.15	-.15	-.15	-.10	-.09	-.14	-.14	-.11	-.11	-.21	-.23	-.15	-.13	-.08	.05	.01	.04	.11	-.03	.05	.33	
(22) Age (T1)	15.00	1.60	0.23	-1.42	.06	.02	-.04	-.07	.13	.06	.00	-.02	-.31	-.23	-.10	-.07	.05	.08	.07	.00	.05	-.04	.03	.01	.04

Note. Excess kurtosis values are reported. Intercorrelations of $r = |.07|$ or above are statistically significantly different from zero at $p < .001$. Continuous measures are presented in their original metric. M = mean; SD = standard deviation.

Table 2

Means of Growth Parameters and Model fit of Cohort-Sequential Latent Growth Curve Models for Three Loneliness Measures

	Direct loneliness measure	Emotional loneliness measure	Social loneliness measure
	Means and effect sizes		
Intercept, parameterized as initial status (age 13)	1.88***	2.02***	1.70***
Linear slope	0.51***	0.37***	-0.77***
Quadratic slope	-0.23***	-0.19***	-0.30***
Intercept, parameterized as endpoint (age 31)	2.05***	2.06***	1.30***
Cohen's *d*	0.20	0.06	0.75
	Variances		
Intercept, parameterized as initial status (age 13)	0.47***	0.38***	0.26***
Linear slope	1.02*	1.12***	0.77***
Quadratic slope	0.25	0.26*	0.17**
Intercept, parameterized as endpoint (age 31)	0.54***	0.33***	0.16***
	Model fit		
χ^2 (*df*)	129.79 (51)	296.17 (110)	322.37 (110)
Comparative Fit Index	.96	.97	.93
Tucker-Lewis Index	.97	.96	.89
Root mean square error of approximation (RMSEA)	.055	.057	.061
95% confidence interval of RMSEA	.043–.066	.049–.065	.053–.069

Note. Cohen's *d* provides measures of effect size of the change of loneliness from age 13 to 31. In the growth curves presented here, age is coded such that linear and quadratic slope parameters represent changes during an interval of 10 years. Coding of age was performed in this manner to avoid numerically small estimates. The slope and quadratic growth estimates have to be divided by 10 and 100, respectively, to provide estimates of changes from one year to the next. Estimates of intercepts and effect sizes are not affected by the scaling of age. Model fit is based on growth curves where trajectories were constrained across cohorts. See the Online Supplemental Material for a more detailed account of examining model fit of these and alternative growth models.

p < .05. **p* < .01. ***p* < .001.

Table 3

Standardized Regression Coefficients of the Relationship Between Time-Invariant Covariates and Growth Parameters of Loneliness (N = 3,116)

	Direct loneliness measure				Emotional loneliness				Social loneliness			
	Intercept, parameter-ized as initial status (age 13)	Linear slope	Quadratic slope	Intercept, parameter-ized as endpoint (age 31)	Intercept, parameter-ized as initial status (age 13)	Linear slope	Quadratic slope	Intercept, parameter-ized as endpoint (age 31)	Intercept, parameter-ized as initial status (age 13)	Linear slope	Quadratic slope	Intercept, parameter-ized as endpoint (age 31)
Female gender	0.19***	0.00	–0.02	0.11***	0.11***	–0.04	0.02	0.04	–0.10**	0.06	–0.05	–0.07**
Parental education	–0.02	0.02	–0.04	0.03	–0.03	–0.03	0.05	–0.02	0.20***	–0.13**	0.08*	–0.01
Parental unemployment/disability	0.03	0.01	0.02	0.09**	0.08*	–0.06	0.07	0.08**	–0.02	0.07	–0.07*	0.02
Not living with both biological parents	0.03	0.05	–0.02	0.10*	0.01	0.06	–0.05	0.05	0.03	0.02	–0.01	0.09**
Parental care	–0.22***	0.01	0.05	–0.09***	–0.30***	0.11**	–0.10**	–0.24***	–0.27***	0.17***	–0.14***	–0.17***
Having siblings	–0.06	0.09*	–0.12**	–0.11***	–0.04	0.07	–0.09*	–0.07**	0.06	–0.08*	0.07	–0.02
Having at least one close friend	–0.29***	0.35***	–0.25	–0.02	–0.25***	0.13**	–0.09	–0.09	–0.18***	0.08	–0.05	–0.06
Leaving parental home (reference group: Moved out at age 18 or later)												
Moved out at age 17 or earlier	0.12***	0.00	–0.02	0.07*	0.07*	0.04	–0.04	0.08*	0.06	0.01	–0.02	0.06*
Lives still at home	–0.01	0.05	0.00	0.10*	0.03	0.02	–0.01	0.07	0.08*	0.03	–0.04	0.08
Living together as a couple (reference group: has never lived together with spouse or partner)												
Lived together at age 25 or earlier	–0.02	–0.04	–0.03	–0.19***	–0.04	–0.07	0.07	–0.08*	–0.13***	0.05	–0.04	–0.11**
Lived together at age 26 or later	0.05	–0.04	–0.03	–0.13***	0.02	0.03	0.03	0.01	–0.09**	0.05	–0.04	–0.05
Being a parent (reference group: becoming a parent at age 25 or later)												
Becoming a parent at age 24 or earlier	0.04	0.08	–0.04	0.15**	–0.04	0.14**	–0.12*	0.07	0.07	0.00	0.01	0.11***
No parenthood	0.03	0.08	–0.02	0.18***	–0.04	0.14*	–0.12*	0.08**	0.05	0.01	0.01	0.11***
Communion	–0.01	–0.05	0.04	–0.03	–0.08**	–0.04	0.05	–0.09*	–0.23***	0.13**	–0.12*	–0.19***
Agency	–0.22***	0.06	–0.01	–0.07*	–0.19***	0.06	–0.05	–0.12***	–0.37***	0.24***	–0.19***	–0.15***

Note. All regression coefficients are completely standardized (i.e., coefficients are based on standardized independent and dependent variables)

*p < .05. **p < .01. ***p < .001.

Table 4

Standardized Regression Coefficients of Growth Parameters of Loneliness Predicting Education, Income, Labor Market Integration, Disability Onset, and Prescription of Antidepressants (n = 3,116)

	Without control for covariates			With control for covariates[§]		
	Intercept	Linear slope	R^2	Intercept	Linear slope	ΔR^2
Direct measure of loneliness						
Education	–0.01	–0.02	.00	–0.06	–0.07	.01
Income	–0.23***	–0.21**	.04	–0.17***	–0.16*	.03
Unemployed[$]	0.15**	0.25*	.04	0.15*	0.31*	.07
Disability[$]	0.29***	0.36*	.10	0.31***	0.39**	.11
Prescription of antidepressants[$]	0.25***	0.39***	.10	0.27****	0.43***	.12
Emotional loneliness						
Education	0.06	0.04	.00	–0.01	–0.01	.00
Income	–0.14***	–0.13*	.01	–0.14***	–0.13*	.02
Unemployed[$]	0.05	0.05	.00	0.06	0.09	.01
Disability[$]	0.16*	0.23*	.04	0.20**	0.26*	.05
Prescription of antidepressants[$]	0.11	0.20	.03	0.12	0.24	.04
Social loneliness						
Education	–0.24**	0.03	.07	–0.13	0.02	.03
Income	–0.25***	–0.15	.02	–0.29***	–0.21*	.03
Unemployed[$]	0.00	–0.11	.01	–0.04	-0.09	.00
Disability[$]	0.30*	0.24	.03	0.30*	0.32	.03
Prescription of antidepressants[$]	0.06	0.04	.00	–0.01	0.02	.00

Note. Multiple regression analyses are performed where intercept and slope of each loneliness measure are entered together as predictors.

[§]Controlled for gender, parental SES, and grades in school.

ΔR^2 = incremental R^2 when controlled for covariates first.

[£]Linear regression models with maximum likelihood estimators were estimated. Completely standardized linear regression coefficients are reported.

[$]Probit regression models with a weighted least square estimator were estimated. Completely standardized probit regression coefficients are reported.
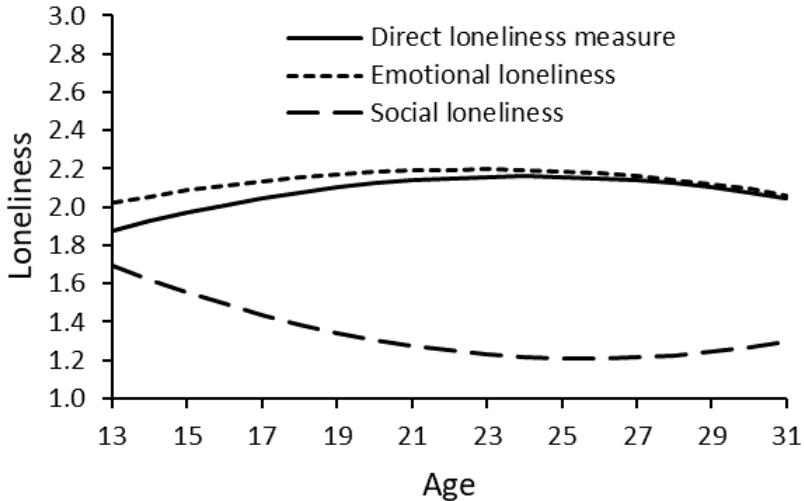
*p < .05. **p < .01. ***p < .001.

Figure 1. Estimated developmental trajectories of three measures of loneliness.
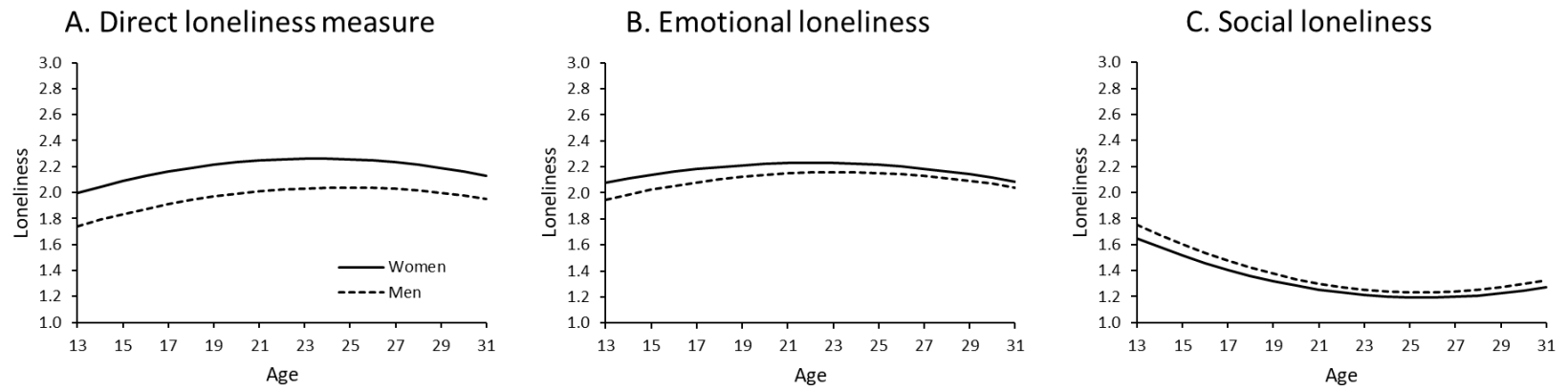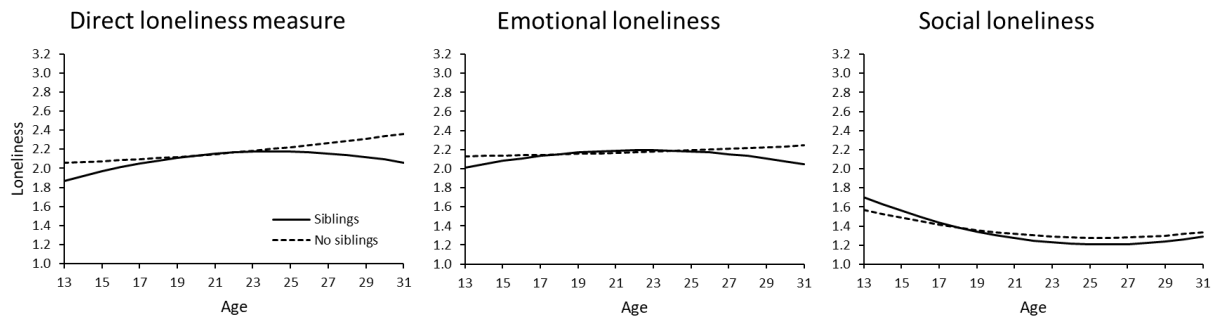
Figure 2. Estimated developmental trajectories of three loneliness measures for men and women.
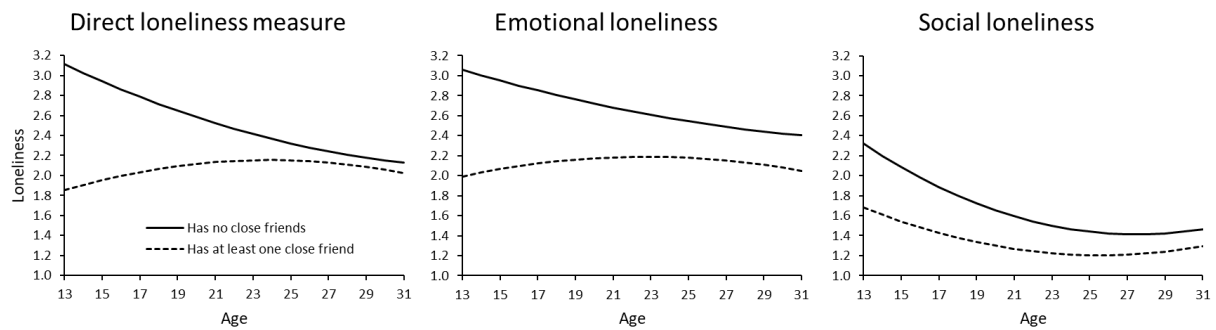
A. Parental care
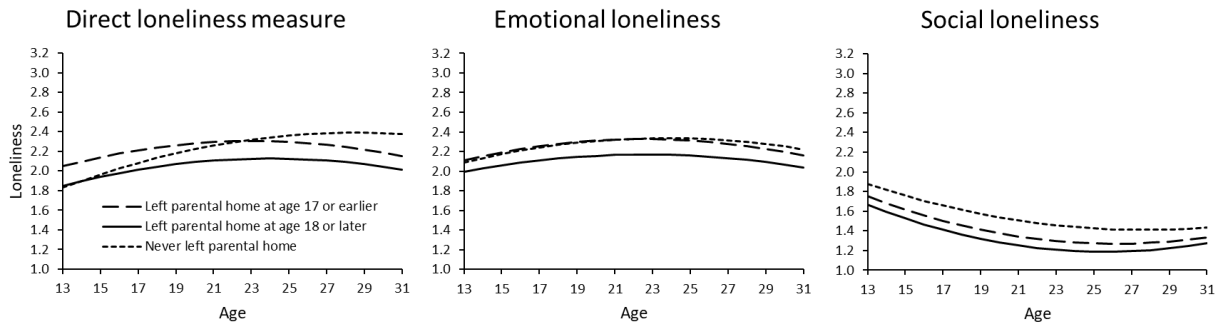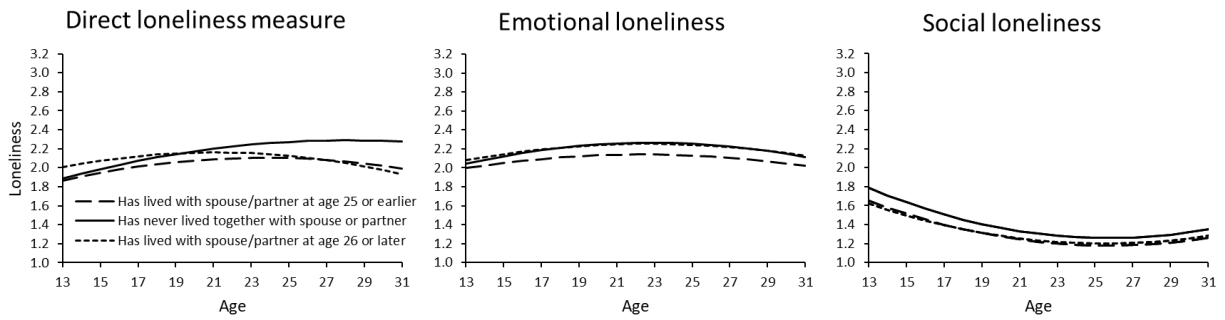

B. Siblings

C. Friendship

Figure 3. Estimated developmental trajectories of three loneliness measures according to three relationship factors

A. Leaving the parental home

Direct loneliness measure   Emotional loneliness   Social loneliness

- - - Left parental home at age 17 or earlier
——— Left parental home at age 18 or later
······ Never left parental home

B. Living together with a spouse or partner

Direct loneliness measure   Emotional loneliness   Social loneliness

- - - Has lived with spouse/partner at age 25 or earlier
——— Has never lived together with spouse or partner
······ Has lived with spouse/partner at age 26 or later

C. Parenthood

Direct loneliness measure   Emotional loneliness   Social loneliness

- - - Parenthood at age 24 or earlier
——— No parenthood
······ Parenthood at age 25 or later

Figure 4. Estimated developmental trajectories of three loneliness measures according to timing of three social transitions