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The background of the cover features stylized silhouettes of four people in various shades of blue, purple, and orange. They are gathered around a table, with one person holding a tablet computer. The overall aesthetic is modern and academic.

CONNECTING AND DISCONNECTING

Information and Communication Technology
in Family Relationships

Kristiina Tammissalo



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Doctoral programme on Inequalities, Interventions and New Welfare State
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To my family

UNIVERSITY OF TURKU

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KRISTIINA TAMMISALO: Connecting and Disconnecting: Information and Communication Technology in Family Relationships

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ABSTRACT

Information and communication technology (ICT), most notably smartphones and social media, have transformed human social interaction. In this thesis, I examine how ICT has been appropriated in families and what effects it has on family relationships. I use two distinct approaches to answer these questions. The first approach is to systematically review the research concerning ICT use and outcomes for family relationships (Article I). Second, I use population-based data from the Generational Transmissions in Finland (Gentrans) survey's third wave and statistical methods to examine digital communication in two Finnish family generations (Articles II–IV). The data include 2,663 older adults (68–74 years) and 1,945 young to middle-aged adults (19–56 years).

The systematic review (Article I) categorizes the existing research based on ICT use types (personal use, “technoference,” communication, and co-use) and according to relationship type (romantic relationship, parent-child relationship, and siblings). The review shows that frequent personal ICT use and technoference undermine relationship quality. Romantic relationships are impacted most negatively due to ICT-induced infidelity and jealousy. In contrast, co-use of ICT mostly benefits family relationships. This also applies to communication via ICT, however, media vary in how strongly they are associated with positive relationship outcomes. Based on the systematic review, I argue that across use types, the negative effects of ICT on family relationships are more salient than the positive.

The articles that are based on the Gentrans data (Articles II–IV) reveal novel information about Finnish adults' ICT use in two family generations. Article II examines the relationship between digital communication and traditional methods of communication (e.g., meeting face-to-face and phone calls). Two opposing hypotheses, the reinforcement and displacement hypotheses, are plotted against each other. The former predicts a positive relationship between digital and traditional forms of communication, and the latter predicts a negative association. Using linear regression, the hypotheses are tested separately for a range of family relationship types across the two family generations (e.g., parent-child, grandparent-grandchild, siblings). The results refute the displacement hypothesis, showing that digital communication reinforces other forms of communication. In other words, digital methods appear to have taken a complementary role in family communication.

Article III identifies predictors of social media adoption in the two family generations. In addition, the study examines whether social media adoption in older adults is predicted by the social media adoption of their adult children. The Gentrans data enable the study of this question because actual parent-child dyads are identifiable. The results from the logistic regressions replicate earlier findings showing that, for example, being female and more highly educated predicts social media use; however, the influence of gender and education is less pronounced among older adults. Furthermore, the number of children predicts social media use, as does the social media use of an adult child. The study highlights that social media adoption, especially among older adults, is contingent on family factors, namely, the number of children and whether the older adults' children have adopted social media.

Last, Article IV estimates the effect of social media contact (SMC) with family members on happiness using two methods: the linear regression and propensity score matching (PSM) approaches. The PSM method is used to improve the credibility of causal inferences. SMC is examined in a range of family relationships across the two family generations. Based on the socioemotional selectivity theory, we hypothesize that SMC with family members increases happiness among older adults. The study finds that SMC with family members can be a source of happiness in some specific dyads and ages; however, the results do not find older adults specifically to be affected.

In addition to the empirical sections, I discuss digital divides (i.e., inequalities related to ICTs). I examine the extent to which ICT-related inequalities manifest in or are contingent on, family relationships. All of the articles provide insight into digital divides. First, the systematic review (Article I) finds evidence of the unequal distribution of positive and negative ICT-related outcomes based on family background and relationship type. Second, the Finnish studies (Articles II–IV) suggest that ICT reinforces communication mainly among those with higher baseline communication and that ICT adoption among (older) adults is partly determined by family support. The family perspective has rarely been addressed in the digital divide literature. The conclusions of this thesis highlight the roles that family relationships play in digital divides.

To conclude, ICT has brought both benefits and challenges to family relationships, which manifest differently across generations and types of family relationships. For future research, this dissertation outlines the research emphases so far and points to gaps. In addition, it makes an opening contribution by discussing family perspectives in digital inequalities. The results have implications for the general public regarding their daily digital choices and can be used to promote digital well-being and digital inclusion in society.

KEYWORDS: Information and communication technology, Social media, Family, Relationship quality, digital divides

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TIIVISTELMÄ

Informaatio- ja viestintäteknologia (engl. information and communication technology, ICT), erityisesti älypuhelimet ja sosiaalinen media, ovat muokanneet vahvasti ihmisten vuorovaikutusta. Väitöskirjassani tutkin, miten ko. teknologioita käytetään perheissä ja millaisia vaikutuksia niillä on perhesuhteiden laatuun. Käytän kahta keskenään erilaista lähestymistapaa. Ensiksi, väitöskirjan ensimmäisessä artikkelissa (I) esitellään systemaattinen tutkimuskatsaus, jossa kootaan ja arvioidaan vertaisarvioitua tutkimusta teknologian vaikutuksista perhesuhteisiin. Toiseksi, kolme muuta artikkelia (II–IV) perustuvat suomalaisen kansallisesti edustavan Gentrans-postikyselyaineiston kolmanteen aaltoon ja kvantitatiivisiin menetelmiin. Näissä kolmessa artikkelissa tutkitaan digitaalista kommunikaatiota suurten ikäluokkien (2 663 osallistujaa; 68–74-vuotiaita) sekä heidän aikuisten lastensa (1 945 osallistujaa; 19–56-vuotiaita) perhesuhteissa.

Systemaattisessa tutkimuskatsauksessa (artikkeli I) luokitellaan tutkimusta ensinnäkin sen perusteella, millaisessa sosiaalisessa kontekstissa ICT:tä käytetään (oma käyttö, ”teknohäiriö”, kommunikaatio ja yhteiskäyttö) sekä toisaalta tutkitun perhesuhdetyyppin mukaan (parisuhde, vanhempi-lapsisuhde, sisarusuhde ja määrittelemätön perhesuhde). Tutkimuskatsauksessa osoitetaan, että runsas oma käyttö ja teknohäiriö heikentävät perhesuhteita. Vaikutus on voimakkainta parisuhteissa, koska niihin vaikuttavat teknologian mahdollistaman uskottomuuden ja mustasukkaisuuden erityiset paineet. Sen sijaan ICT:n yhteiskäyttö ja kommunikaatio enimmäkseen hyödyttävät perhesuhteita, mutta huomionarvoista on, että eri viestintämenetelmät eroavat siinä, kuinka rikasta (rich) viestintää ne välittävät. Tutkimuskatsauksen johtopäätöksenä esitän, että ICT:n kielteiset vaikutukset perhesuhteisiin ovat näkyvämpiä kuin myönteiset.

Gentrans-aineistoon perustuvissa artikkeleissa (II–IV) tuodaan uutta tietoa suomalaisten aikuisten ICT:n käytöstä kahdessa eri perhesukupolvessa. Artikkelissa II tutkitaan digitaalisten ja perinteisten yhteydenpitotapojen (esim. kasvokkain tapaamiset ja puhelut) suhdetta. Tutkimuksessa testataan kahta vastakkaista hypoteesia: vahvistamishypoteesia ja syrjäyttämishypoteesia. Näistä ensimmäinen ennustaa, että digitaaliset menetelmät ovat lisänneet perinteistä yhteydenpitoa; jälkimmäinen puolestaan ennustaa, että perinteiset yhteydenpitotavat ovat vähentyneet digitaalisten menetelmien lisääntyttyä. Hypoteesien testaamisessa

hyödynnetään Gentrans-aineiston molempia perhesukupolvia ja hypoteesia testataan useissa perhesuhteissa (vanhempi-lapsisuhteessa, sisarusten välillä jne.) lineaarisella regressiolla. Tulokset eivät tue syrjäyttämishypoteesia eli sitä, että digitaaliset menetelmät syrjäyttäisivät muita yhteydenpitotapoja. Sen sijaan digitaalinen yhteydenpito näyttäisi ottaneen täydentävän roolin perheenjäsenten välisessä yhteydenpidossa.

Artikkelissa III tunnustetaan tekijöitä, jotka ennustavat sosiaalisen median omaksumista kahdessa eri perhesukupolvessa. Tämän lisäksi tutkimuksessa selvitetään, ennustaako nuoremman perhesukupolven edustajan sosiaalisen median omaksuminen myös tämän vanhempaa perhesukupolvea edustavan äidin/isän sosiaalisen median omaksumista. Gentrans-aineisto mahdollistaa tällaisen selvityksen, koska aineistossa toisilleen sukua olevien vanhempien ja aikuisten lasten vastaukset ovat liitettävissä toisiinsa. Logistisen regression tulokset toistavat aiempien tutkimusten tuloksia: naiset ja korkeasti koulutetut käyttävät todennäköisemmin sosiaalista mediaa kuin miehet ja matalammin koulutetut. Nämä vaikutukset kuitenkin laimenevat vanhempien vastaajien keskuudessa. Lisäksi mitä enemmän lapsia vastaajalla on, sitä todennäköisemmin hän on myös sosiaalisen median käyttäjä. Lopuksi: vanhemman perhesukupolven edustajan sosiaalisen median omaksumista ennusti tämän aikuisen lapsen sosiaalisen median omaksuminen. Tutkimus osoittaa, että sosiaalisen median omaksuminen erityisesti ikääntyvien keskuudessa riippuu osittain heidän perhesuhteistaan: tarkalleen ottaen heidän lastensa lukumäärästä ja siitä, käyttävätkö nämä aikuiset lapset sosiaalista mediaa.

Viimeisenä artikkelissa IV tutkitaan kahdella eri menetelmällä, onko sosiaalisen median kautta tapahtuvalla yhteydenpidolla (social media contact, SMC) perheenjäsenen vaikutusta onnellisuuteen. Käytetyt menetelmät ovat lineaarinen regressio ja propensity score matching -menetelmä, joista jälkimmäisen avulla on mahdollista tehdä vahvempia kausaalipäätelmiä. Yhteydenpitoa eri perheenjäseniin (tyttäreeseen, poikaan, siskoon jne.) tutkitaan erikseen. Tutkimus ennusti sosioemotionaalisen valintateorian (socioemotional selectivity theory) perusteella, että SMC perheenjäsenten välillä lisäisi onnellisuutta erityisesti ikääntyvien keskuudessa. Tulokset osoittivat, että SMC perheenjäsenten kanssa voi joissakin tietyissä perhesuhteissa ja ikävaiheissa lisätä onnellisuutta, mutta tulokset eivät tue sosioemotionaalisesta valintateoriasta johdettua hypoteesia siitä, että erityisesti ikääntyvien onnellisuus lisääntyisi perheenjäsenten keskinäisestä yhteydenpidosta. Sitä vastoin tulokset osoittivat, että nuoremmassa perhesukupolvessa SMC:llä on joissakin perhesuhteissa onnellisuutta lisäävä vaikutus.

Artikkelien päätulosten lisäksi käsittelem tässä väitöskirjassa digitaalista eriarvoisuutta (digital divides). Pohdin, millä tavoilla digitaalista eriarvoisuutta syntyy perhekontekstissa. Systemaattisessa tutkimuskatsauksessa (artikkeli I) esitetään, miten ICT:n myönteiset ja kielteiset vaikutukset jakautuvat epätasaisesti erilaisille perheille ja perhesuhdetyypeille. Lisäksi suomalaisen aineistoon perustuvissa tutkimuksissa (artikkelit II–IV) näytetään, että ICT hyödyttää perheyhteydenpidossa lähinnä niitä, joilla yhteydenpito on muutenkin runsasta. Viimeiseksi ICT:n omaksuminen ikääntyvillä on todennäköisempää niillä, jotka saavat tukea nuoremmilta perheenjäseniltä. Väitöskirjan päätelmissä esitän, että

artikkelien (I–IV) tulosten perusteella perhesuhteet ja perhetaustat ovat digitaalisia eriarvoisuuksia konstruoivia tekijöitä.

Yhteenvedona esitän, että ICT on tuonut sekä hyötyjä että haasteita perhesuhteisiin, jotka näyttäytyvät erilaisina sukupolvesta ja perhesuhdetyypistä riippuen. Tulevia tutkimuksia hyödyttävät tässä väitöskirjassa esiin tuodut tähänastisen tutkimuksen painotukset ja puutteet. Lisäksi tämä väitöskirja on tehnyt uuden avauksen digitaalisia kuiluja koskevaan keskusteluun käsittelemällä digitaalisen eriarvoisuuden perhenäkökulmia, jotka ovat tähän asti puuttuneet keskustelusta. Tulosten helppo sovellettavuus yksilöiden päivittäisiin digivalintoihin tekee tuloksista laajalle yleisölle kiinnostavia. Tuloksista on hyötyä myös yhteiskunnalliseen digitaaliseen hyvinvointiin ja osallisuuteen liittyvässä päätöksenteossa.

ASIASANAT: Informaatio- ja viestintäteknologia, sosiaalinen media, perhe, suhteen laatu, digitaalinen eriarvoisuus

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I started my studies in the INVEST doctoral program at the University of Turku in 2020 when the pandemic brought with it the opportunity to study and work from home. Living in Helsinki and also expecting my second child to be born that year, I happily accepted this arrangement. Despite the distance, INVEST facilitated my doctoral studies both practically and by embedding me in a high-standard research community. This enabled my studies and secured the quality of my work. I am deeply grateful that my proposal was accepted to be part of the INVEST flagship.

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List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

- I Tammisalo, Kristiina and Rotkirch, Anna. Effects of Information and Communication Technology on the Quality of Family Relationships: A Systematic Review. *Journal of Social and Personal Relationships*, 2022; 39 (9): 2724–65.
- II Danielsbacka, Mirkka, Tammisalo, Kristiina, and Tanskanen, Antti Olavi. Digital and Traditional Communication with Kin: Displacement or Reinforcement? *Journal of Family Studies*, 2022.
- III Tammisalo, Kristiina, Danielsbacka, Mirkka, Andersson, Emilia, and Tanskanen, Antti Olavi. Predictors of Social Media Use in Two Family Generations. *Frontiers in Sociology*, 2022; 6.
- IV Tammisalo, Kristiina, Danielsbacka, Mirkka, Tanskanen, Antti Olavi, and Arpino, Bruno. Social Media Contact with Family and Happiness in Younger and Older Adults. Submitted to journal.

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Abbreviations

ICT	Information and communication technology
SMC	Social media contact
PSM	Propensity score matching

1 Introduction

Information and communication technology (ICT) has penetrated almost every corner of our daily lives. Besides vastly broadening the boundaries of communication, the ways in which we work, seek information, shop, relax, and pass the time have also been revolutionized by ICT. In response, concerns have arisen about ICT displacing other essential activities, such as face-to-face interaction with family and friends (McDaniel, 2015; Twenge et al., 2019). From this perspective, the technology that was originally developed for the purpose of communication may have inadvertently displaced communication with those we are closest to. This ambivalence – as captured in the title *Connecting and Disconnecting* – has been the inspiration for this thesis.

In popular rhetoric, ICT in daily family life is both praised and demonized. On the one hand, the mass adoption of ICT demonstrates that it has been welcomed with enthusiasm. For example, time spent using ICT in households has steadily grown for two decades (Hartshorne et al., 2021; Mullan & Chatzitheochari, 2019). Also, the number of devices in households has increased so that now both the very youngest as well as the oldest family members commonly have devices of their own (Faverio, 2022; Rideout, 2017; Vogels, 2019).

On the other hand, many have noticed that ICT does not always work in our best interest. The industry competition for users' attention has driven ICTs to become purposefully habit-forming and disruptive (Anderson et al., 2018; Eyal, 2013; Oulasvirta et al., 2012). Consequently, many families suffer from disruptions to daily routines, such as mealtime interactions and sleep schedules (Nelson, 2019; Robb, 2019; Storch & Ortiz Juarez-Paz, 2019). Moreover, concerns about the deteriorating quality of face-to-face interaction have been voiced by prominent critics (Turkle, 2011; Twenge, 2017).

As precautions, health authorities have advised screen-time restrictions (Davies et al., 2019; Viner et al., 2019; WHO, 2019), and psychologists have called for stricter ethical guidelines for the industry (Anderson et al., 2018). However, although the concerns are widely shared, the restrictive measures have not been endorsed without reservation among families. This may be – professional critics emphasize – because the restrictive approaches are detached from family realities and based on a

simplistic view of ICT use (Blum-Ross & Livingstone, 2018; Przybylski & Weinstein, 2019). The critics have rightly pointed out that an hour of screen time in one family is not the same as an hour of screen time in another family. They argue that in order for restrictions to be effective in supporting family functioning, further understanding of the *types* of ICT uses that are relevant in the family context is essential. In other words, it is equally important to identify the types of ICT uses that hinder family functioning as it is to recognize the types that are neutral or positive.

With this background as motivation, this thesis aims to identify family-relevant aspects of ICT use that impact family relationships in either positive or negative ways. As my objective is to improve the understanding of both the negative and positive effects, I address a range of ICT uses, from disruptive personal use in family settings to communication and co-use with family members. Although I include a range of ICTs from hardware (e.g., smartphones, computers, game consoles, tablets) to software (e.g., internet, social media, games, communication platforms), the focus is not on them. Rather, I focus on the social contexts in which ICTs are embedded.

This thesis presents four studies (Articles I–IV) that provide answers to the following questions: Do various ICT use types, such as using ICT for personal purposes while co-present with family members, affect the quality of family relationships? How about ICT use for communication between family members and co-use of ICT? Has ICT displaced in-person family interactions, and to what effect for family relationships and the individuals in them? Finally, how are the various effects of ICT distributed across different kinds of families, relationships, and generations?

1.1 ICT in the Family Relationship Context

Ever since internet connections appeared in households, scholars have sought to identify the aspects of ICT that are consequential for family relationships (Hodge et al., 2012; Lanigan et al., 2009). During these past decades, the continuous and rapid development of ICT has created a continuous demand for updated research on ICT use in families. What, then, are the current aspects of ICT that are consequential for families, and how do they differ from past technologies? There are at least four recent trends to consider.

It was only after 2015 that scholars from both media research and family research started to study how distractions due to ICT have affected relationships (McDaniel & Coyne, 2016a, 2016b; McDaniel et al., 2017; McDaniel & Radesky, 2018a, 2018b; Nuñez & Radtke, 2023; Sbarra et al., 2019) with only one study to my knowledge predating 2015 (Leggett & Rossouw, 2014). Pioneering work has been delivered by Brandon T. McDaniel, who also coined the term *technoference* (*technology* + *interference*) to describe the use of ICT while physically co-present

with family members (McDaniel, 2015). Despite the salience of the behavior and the surge of academic interest in it after 2015, the research on technoference and how it affects family relationships is reviewed in this thesis for the first time in Article I (Nuñez & Radtke, 2023). Article I is a systematic review of the effects of ICT on family relationship quality. It compiles 73 studies from 2009–2019 and synthesizes the effects of ICT for different family relationship types.

The second recent trend, at least in Finland, is that the frequency of face-to-face interaction with family members has decreased at the population level (Hanifi, 2019; OSF, 2021). For example, the most popular answer to the question “How often do you visit your non-resident parents?” was “Once a week” in 2002, whereas in 2017, it was “Once a month” (Hanifi, 2019). Coincidentally or not, smartphones and social media were not yet available in 2002, whereas in 2017, the vast majority of adults used both (Hanifi, 2019; OSF, 2020; Perrin, 2017). Whether smartphones and social media have *caused* the decline in social interaction is not clear. Some evidence suggests that this is not the case. For example, studies from across Europe indicate that socializing via ICT is associated with in-person socializing positively rather than negatively (Amichai-Hamburger & Hayat, 2011; Fortunati et al., 2013). (It is important to note that these results were acquired before smartphones and social media became widespread).

Although the results are inconclusive, much can be said about how ICT has introduced alternative ways of being social, which has impacted individuals’ social lives. These new ICT-augmented ways of being social embody so-called *networked individualism*, in which social networks are looser but further-reaching, multiple, and overlapping (Quan-Haase et al., 2018). This implies that while close family members are visited less frequently, as the Finnish statistics show (Hanifi, 2019), many may instead be connecting with a larger network, for example, with extended family, more than was possible before (Quan-Haase et al., 2018). Relating to this shift toward broader but looser networks, the questions arising are whether, indeed, ICT has displaced traditional methods of communication in family networks and whether this has consequences for the *quality* of family relationships. These issues are addressed in two of the articles in this thesis (Articles I and II), which examine how different communication methods relate to each other. More specifically, Article II examines whether digital methods have displaced traditional methods in a range of kin relationships from close to more distant kin using Finnish data. Article I, on the other hand, systematically reviews the existing published research on how various methods of communication (e.g., face-to-face, instant messaging, social media, email) affect the quality of family relationships.

A third trend is the growing ICT use among adults, especially older adults. Recent statistics show that a rapidly growing user group of ICT is adults over the age of 65 (Faverio, 2022; Vogels, 2019). Despite the growth, adults’ ICT use, especially

that of older adults, has not attracted due attention or raised concerns to the same extent as children's ICT use. There is an indication, however, that an awareness is on the rise: for example, surveys among parents and their children in the US show increasing concerns about excessive parental ICT use in families (Robb, 2019). In addition, during the preparation of this thesis, adults' ICT use has been increasingly problematized in the popular media in Finland.

To date, academic research has also reflected an imbalance. For example, the dominating research topic in the intersection of ICT and family research has been *digital parenting* (Mascheroni et al., 2018), in which the focus has mainly been on children's ICT use while the parents' own ICT use and bidirectional influences have not been central (Modecki et al., 2022). (While digital parenting in its many forms, such as attitudes toward ICT, monitoring, and restrictions of children's ICT use, fall beyond the scope of this thesis, parts of Article I are relevant for digital parenting as it reviews the research on parents' ICT use and parent-child ICT co-use and how these affect the parent-child relationship).

The growing ICT use by adults also needs to be addressed in contexts other than parenthood. For example, digital parenting has little relevance to the growing user group of over 65-year-olds. Understanding how ICT use relates to their social networks and well-being is of growing importance in societies such as Finland that are concurrently both digitalizing and aging. In this thesis, three articles address older adults' ICT use in Finland (Articles II–IV). Using quantitative methods, these articles examine the use of ICT for family communication among a wide age range of Finnish adults up to the age of 75 years and the antecedents and consequences of their ICT use.

The final trend addressed in this thesis is that of ICT-related inequalities, also known as *digital divides*. The digital divide literature of the past decade has concentrated on the inequalities in ICT use between various groups and the differences in the extent to which these groups can benefit from ICT. Curiously, in this literature, the family context is almost entirely absent (Lythreath et al., 2022; Scheerder et al., 2017). To address this gap, I discuss whether the benefits and harms of ICT use accumulate in some family relationship types more than in others, whether they cluster with other (dis)advantages in the family, and whether they are transmitted between family generations. For example, I consider whether certain types of family relationships (or the lack thereof) are associated with social media adoption or particular types of effects of ICT use. Although I seek answers to these questions based on the results of the articles, the articles themselves only briefly refer to digital divides. Therefore, further elaboration on digital divides is a unique contribution of this volume. I present the digital divide framework in Chapter 2. Then, I review the family-relevant evidence relating to digital divides in Chapter 3, pointing to the gaps in the literature. Finally, I discuss the implications of the results

for digital divides in Chapter 7. With the discussion about digital divides, I link the empirical contributions of this thesis, which otherwise focus narrowly on the level of family relationships and mechanisms through which ICT affects relationships, to a broader societal discourse on inequalities.

1.2 Family Relationships in the ICT Context

Relationship-level outcomes of ICT use have attracted significantly less attention than the extensively studied individual-level outcomes, such as depression and health (Dickson et al., 2018; Stiglic & Viner, 2019). However, it is well-known that the quality of relationships is an essential component in individuals' long-term well-being (Cacioppo & Cacioppo, 2014; Deindl et al., 2016; Dunbar, 2021; Yang et al., 2015). Therefore, the relationship focus in this thesis complements the overall understanding of human well-being in the digital era.

By focusing specifically on *family* relationships, this thesis taps into the core social networks of individuals at different life stages. Even in urbanized Western societies, which are characterized by smaller and looser family networks, the family remains a significant source of support and informal care long after childhood (Hampton & Ling, 2013; Henrich, 2020). This also applies to so-called strong welfare states like Finland, despite their state-provided public care services (Danielsbacka et al., 2020). Indeed, even in modern Western populations, family relationships remain the most enduring relationships throughout the lifespan, becoming especially salient sources of support and well-being in life transitions such as when moving away from the birth family (Roberts & Dunbar, 2011), entering parenthood (Balbo & Mills, 2011) or grandparenthood, and in later life-stages (Arpino et al., 2018; Danielsbacka & Tanskanen, 2016; Wrzus et al., 2013).

The role of family relationships in an individual's life changes depending on the relationship type and life stage. Different relationship types within families, such as the relationship between a parent and a child or between siblings, have their typical dynamics, and these dynamics change in typical ways throughout the lifespan (Buchanan & Rotkirch, 2021; Hamilton, 1964; Tanskanen & Danielsbacka, 2019). I approach these relationships-specific dynamics from an evolutionary perspective. From this perspective, family-relationship dynamics are seen as displaying strategies that were adaptive in human evolution and that continue to shape family dynamics.

Considering the differences in relationship dynamics, it is justified to assume that ICT may also affect each relationship type in relationship-specific ways. Therefore, the research design in all of the studies (Articles I–IV) treats family relationship types separately in order to capture any relationship- and life-stage-specific patterns. Each article focuses on a range of family relationships. More specifically, Article I examines mainly within-household relationships (parent-child,

sibling, and romantic relationships), whereas Articles II–IV focus on the extended family, such as adult children and their older parents, adult siblings, nieces, nephews, in-laws, and grandparents.

1.3 Structure of the Thesis

The structure of this thesis is as follows. In Chapter 2, I present the theoretical background of the thesis, starting with family theories followed by media theories. In Chapter 3, I review the earlier research relevant to ICT use in family relationships and outline the gaps in the literature, which are then addressed in the four independent articles. In Chapter 4, I summarize the empirical and theoretical aims of the thesis as well as the more specific aims of each article. Chapter 5 gives an overview of the methods and materials used in the articles. Chapter 6 summarizes the main findings of the articles and discusses the results in relation to the earlier literature, leaving the implications for digital divides to be discussed separately in Chapter 7. Last, in Chapter 8, I draw conclusions from the findings and propose how these can be used to promote digital well-being in society.

2 Theoretical Background

The theories presented in this chapter play a variety of roles in my thesis. They have informed the research designs in the articles (I–IV) by either leading to specific questions (e.g., the displacement hypothesis and the socioemotional selectivity theory) or by more broadly influencing the choices of focus (e.g., the evolutionary approach and media richness theory). They also connect the articles to the existing family and media research literature. I start by describing family-related theories and continue with those related to ICT use. Last, I present the digital divide framework, which combines a strand from each empirical section under one overarching theoretical framework.

2.1 Theoretical Approaches to Family Relationships

Definitions of family and the range of individuals who are assigned various kinship labels vary across time and cultures (Chambers & Gracia, 2021). This thesis employs a biological definition in which genetic relatedness and romantic pair bonds define family relationships. Notably, this definition transcends households, including individuals such as grandparents and adult siblings – colloquially referred to as the *extended family*.

In addition to the biological definition of family, my approach to family relationship dynamics is an *evolutionary* one. According to the evolutionary approach, a range of distinct cognitive, emotional, and behavioral predispositions have evolved for the purpose of navigating family and non-family relationships as well as various relationships within families (Dunbar, 2021; Hamilton, 1964; Sarmaja, 2003; Trivers, 2002). These evolved predispositions, still observable today, are the result of selective pressures in the evolutionary environments of human ancestors.

The fundamental difference between the evolutionary approach and the other theories that represent more traditional social science approaches is that the latter are most often *mechanism-level theories* focusing on psychological and social processes leading to certain behaviors. On the other hand, the evolutionary approach seeks to explain observable traits (in addition to the mechanisms that lead to them) with their

(historic) adaptive functions. The evolutionary explanation can be considered to answer “*Why*” questions, while the mechanism-level theories address “*How*” questions (Tinbergen, 1963). These theories address different levels of explanation and can be used to complement each other in explaining human behavior (Danielsbacka, 2016).

In this thesis, applying the evolutionary approach provides a theoretical basis for treating family separately from non-family and for interpreting differences that occur between various relationship types within the family (e.g., romantic relationships, parent-child, sibling). It also provides grounds for examining relationships in different life stages separately (e.g., younger adults’ family relationships vs. older adults’ family relationships). Notably, much of the earlier research on ICT use in close relationships does not differentiate between family and non-family relationships (Chan, 2018; P. F. Chang et al., 2015; Dienlin et al., 2017; Neves, 2015; Wrzus et al., 2013). From an evolutionary point of view, this distinction is important. Moreover, the evidence also indicates that family relationships and friendships have responded differently to ICT. For example, some platforms are preferred for communication with friends and others for communication with family. In addition, ICTs can change communication patterns differently in family and non-family relationships (Li et al., 2022) and have a different effect on satisfaction in family versus non-family relationships (Nuñez & Radtke, 2023).

In addition to the family versus non-family distinction, the evolutionary approach suggests that there may be relationship-specific mechanisms through which ICT affects the various relationships within families. From the evolutionary perspective, the dynamics of, for example, romantic relationships and siblings are very different. Therefore, it is reasonable to assume that the mechanisms through which ICT affects those relationships also differ.

This thesis defends the view that the same predispositions that were shaped by selective pressures in evolutionary environments continue to be relevant aspects of family relationships today. Next, I present the evolutionary accounts for some of the unique characteristics of family relationships and draw links between these evolved traits and the ways in which they manifest in modern-day ICT use.

2.1.1 Primacy of Closer and Younger Relatives

Natural selection has favored the formation of kin bonds and the additional participation in caring for offspring by other individuals besides the mothers in the family network (Hrdy, 2009; Kramer, 2010). This caring behavior between family members has been formalized in the *inclusive fitness theory*, also known as *Hamilton’s rule* (Hamilton, 1964). The rule posits that members of kin tend to help each other in proportion to their degree of relatedness. In other words, the more genes

two individuals have in common, the more they can increase their *inclusive fitness* by investing in one another's well-being. These shared genes, then, are more likely to be represented in future generations. Since the degree of relatedness between family members varies, Hamilton's rule leads to direct predictions about the degree of investment depending on relationship types (Buchanan & Rotkirch, 2021; Hamilton, 1964; Tanskanen & Danielsbacka, 2019). For example, all else being equal, siblings are expected to invest in one another more than cousins because the degree of relatedness between siblings is higher.

In applications of the inclusive fitness theory, *communication* has been considered a form of *social investment*, and communication is sometimes used in research as a proxy for investment (Pollet, 2007). For example, communication frequency between kin has been used to predict fertility: the logic being that the more communication with kin the (future) parent has, the more helpers they perceive to be available for a new child.

Relevant for this thesis, the inclusive fitness theory predicts that communication effort – like other forms of investment – varies with genetic relatedness, so that closer kin communicate more frequently than more distant kin.

As an extension, the inclusive fitness theory also predicts that the extent of investment between kin varies with age because reproductive potential declines with age. More specifically, investment in relatives with higher reproductive potential increases the relative gains of the investment, and therefore, there has been a selective pressure favoring investment in younger kin (Hamilton, 1964; Hughes, 1988). From this, it follows that younger family members are more likely to be the receivers of investment since the reproductive potential is higher among younger individuals. Conversely, older family members are more likely to be the investors.

Abundant evidence from human populations supports Hamilton's rule and the predicted age bias (Hrdy, 2009; Kramer, 2010; Tanskanen & Danielsbacka, 2019). Evidence also indicates that communication – as a form of social investment or a proxy for investment – follows the predicted patterns: that is, closer relatives communicate with one another more than more distant ones, and older individuals communicate with kin more than younger individuals do (Wrzus et al., 2013).

In this thesis, investment in close kin and age bias are viewed as evolved traits that continue to manifest in family communication patterns. More specifically, different degrees of communication effort between closer and more distant relatives and generational differences are expected. The study designs in all the articles (I–IV) reflect this view, in that they address a variety of family-relationship types. These are the genetically closest family relationships (parent-child and siblings), more distant ones (grandparent-grandchild and aunt/uncle-niece/nephew), as well as non-genetic family relationships (romantic relationships and in-laws). In addition,

different life stages (two family generations), genders, and lineages (e.g., maternal vs. paternal grandparents) are considered separately.

2.1.2 Comparing the Socioemotional Selectivity Theory and the Inclusive Fitness Approach

Besides the evolutionary account, I consider the *socioemotional selectivity theory* as an explanation for the age bias mentioned above (i.e., older individuals communicate with kin more than younger individuals). The theories are congruent: they predict increasing communication effort with family members as individuals become older. However, the socioemotional selectivity theory additionally specifies that an emotional reward (i.e., happiness) should be observed in connection to the behavior. This prediction derives from the theory's assumption that with advancing age there is a motivational shift from informational goals toward emotionally gratifying goals prompted by the realization of finite time toward the end of life. As a result of this process, older individuals more often than younger individuals are expected to invest in a smaller number of emotionally gratifying relationships – most often family (Carstensen et al., 1999; Löckenhoff & Carstensen, 2004; Wrzus et al., 2013).

In Article IV, we test the socioemotional selectivity theory in relation to social media. Specifically, we first test whether older adults' social media use is more family oriented (predicted by both the evolutionary approach and the socioemotional selectivity theory). Second, we test whether older adults' contact with family members via social media is associated with increased happiness (predicted by the socioemotional selectivity theory).

As stated previously, the fundamental difference between the evolutionary approach and the socioemotional selectivity theory is that the latter is a *mechanism-level theory* focusing on the motivating factors (finite time) and emotional rewards (emotional gratification) of communication. In contrast, the evolutionary approach views older adults' tendency to direct more communication effort toward kin as a manifestation of the adaptive tendency to invest in family, especially younger family members, in older age. The theories address different levels of explanation and are complementary.

2.1.3 Converging and Diverging Interests: The Case of Romantic Relationships

It is important to note that the inclusive fitness theory does not imply that relatives' interests are identical. In fact, it also implies *diverging* interests, as even closest kin are only partially genetically related (except for the rare case of monozygotic twins). Like the shared interests discussed above, diverging interests, too, manifest in

relationship-typical ways; for example, siblings are also rivals and tend to compete for parental resources (Pollet & Hoben, 2011). In addition, diverging interests too reflect the degree of relatedness and reproductive potential; for example, in the parent-child relationship, children tend to push the limit of parental investment further than what parents are willing to invest, which elicits conflict to varying degrees depending on the reproductive potential of both the parent and the child (Trivers, 2002).

Most substantially addressed in this thesis are the diverging interests between romantic partners. First, it is important to acknowledge that despite being genetically unrelated, romantic partners are commonly considered family (also in this thesis). This also follows from the inclusive fitness theory: romantic partners (as well as other affinal kin, e.g., in-laws) share genetic interests because of third (future) individuals who are related to both.

In romantic relationships, typical sources of conflict are infidelity (be it actual or imagined) and romantic jealousy. In the evolutionary context, infidelity and jealousy are evolved emotional and behavioral strategies to navigate conflicting reproductive interests. More specifically, infidelity is the redirecting or parsing of reproductively relevant resources to one or more other partners besides the primary partner. On the other hand, jealousy is the primary partner's counterstrategy, which aims to minimize the costs that the partner's infidelity may have on the primary partner's own reproductive success. (Buss, 2018)

It has been noted in literature reviews on romantic relationships that ICT has facilitated access to alternative (actual or imagined) partners and, consequently, more frequent ICT use is associated with infidelity and jealousy (Imperato & Mancini, 2019; Rus & Tiemensma, 2017; Vossler, 2016). In this thesis, as part of the systematic review (Article I), I consider ICT-facilitated access to alternative partners (actual or imagined) as a relationship-specific mechanism through which ICT affects relationship quality in romantic relationships.

In sum, the evolutionary approach is the theoretical basis that justifies the separation of family-relationship types and life stages in the study designs employed in the articles (I–IV). In addition, it is used to interpret the results about the degree of communication effort between closer and more distant family members, age biases in communication, and finally, the specific challenges that ICT has introduced into romantic relationships.

2.2 Media Theories: Mechanisms by which ICT Affects Family Relationships

Numerous theories from media and communication studies bring insight into the mechanisms through which ICT affects family relationships. I draw on the following

theories: the *displacement hypotheses*, the *niche theory*, and the *media richness theory*. These theories describe the underlying structure and processes of human communication. Although they mostly predate the digital revolution, they have also been used to describe the mechanisms by which today's ICT affects personal relationships.

The displacement hypotheses have referred to multiple kinds of displacement across disciplines and research traditions. In media research, displacement can refer to, for example, the displacement of time, attention, or social interaction (either mediated or in-person). More specifically, time displacement means that time spent with ICT is time *not* spent interacting with family members (Hall et al., 2019; Twenge et al., 2019; Vilhelmson et al., 2016). Attention displacement, on the other hand, refers to being preoccupied with ICT in a way that inhibits interaction with the immediately present environment (Sbarra et al., 2019). The evidence of these two kinds of displacement and their effects on family relationships are reviewed in Article I.

The third type of displacement is based on the niche theory, which posits that new methods of communication can displace existing methods of communication if the new and old methods gratify the same communication needs; that is, compete for the same *niche* (Dimmick et al., 2000; Dimmick & Rothenbuhler, 1984). Conversely, if an emerging medium occupies a distinct niche, the new and old communication methods can be used concurrently. This particular type of displacement is addressed in Article II, which tests whether new digital methods have displaced traditional communication methods, such as face-to-face communication and phone calls, or whether digital methods complement other methods.

In addition to the displacement hypotheses and the niche theory, which describe the environmental and human constraints of media use (Dimmick et al., 2000; Dimmick & Rothenbuhler, 1984; Hall et al., 2019; Sbarra et al., 2019), I address the media richness theory, which describes the quality of the media themselves (Daft & Lengel, 1986). According to the media richness theory, different methods of communication have distinct qualities, which mediate intimate communication to varying degrees (Daft & Lengel, 1986). The theory was originally developed in the field of organizational communication, but it has also been applied in personal relationship research (Cui, 2016; Goodman-Deane et al., 2016; Liu & Yang, 2016).

The theory uses "richness" to describe the quality of various types of communication (both face-to-face and mediated). Richness refers to whether the communication method conveys non-verbal cues, whether it upholds real-time communication, and whether the communication is personal or broadcast to a larger audience (Cui, 2016; Daft & Lengel, 1986; Goodman-Deane et al., 2016; Liu & Yang, 2016). The theory considers face-to-face communication the "richest" method of communication. Adapted to modern ICT, phone calls and video calls also have

“rich” qualities as they convey non-verbal cues and require synchronized effort. In contrast, email and social media are asynchronous, text-based, and can be impersonal if intended for a number of recipients, which is why they are considered “less rich.”

The media richness theory is used in Article I to organize the studies in the systematic review into a gradient from “rich” to “less rich,” depending on the media each of the studies addresses. This allows examination of the synthesized findings to see whether “richer” and “less rich” media are related differently to relationship quality. Then, deriving from these findings (i.e., that “rich” and “less rich” media are related differently to relationship quality), Article II tests whether the “less rich” digital methods of communication have displaced traditional “richer” methods. If, indeed, media differ in their “richness”, and this has implications for family relationship quality (studied in Article I), this justifies the need to understand whether ICT has displaced more traditional methods of communication, such as face-to-face communication and phone calls (studied in Article II). In addition, in Article IV, using the same data, we test whether the “less rich” communication with family members via social media is beneficial (i.e., a source of happiness) despite being “less rich”.

2.3 Digital Divides and the Family Context

As the final theoretical approach in this thesis, I use *digital divides*. Digital divides refer to inequalities related to ICT use and the processes that generate those inequalities.

Originally, the digital divide referred to a divide in access to the internet. Later, in regions with near-universal internet access, the focus shifted from differences in access to differences in usage. This so-called *second-level digital divide* focused on differences in skills and use patterns, such as whether ICT is used for social, political, or economic purposes as well as the socio-demographic determinants behind the different types of use (Büchi et al., 2016; DiMaggio et al., 2004; Hargittai, 2010).

More recently, yet a third level of digital inequality has been recognized (Scheerder et al., 2017). The *third-level digital divide* refers to inequalities in the extent to which users can extract benefits from ICT. The research on third-level digital divides has established that ICT enables bigger relative gains among more advantaged users, thereby reinforcing existing inequalities (van Deursen & Helsper, 2015). For example, an individual with a well-functioning social network or a good labor market position can use ICT to extract further value from those resources. Correspondingly, ICT-related harms may cluster among those with prior disadvantages (Gui & Büchi, 2021; Helsper, 2012). For example, lower education is associated with ICT overuse problems (Gui & Büchi, 2021).

The third-level digital divide and the assumption of widening inequalities have also been challenged by an opposing approach. The opposing approach posits that ICT can, in some cases, *compensate* for disadvantages rather than reinforce them – particularly when ICT is used for socializing and accessing social support (Blank & Lutz, 2018; Büchi et al., 2016; Rains & Tsetsi, 2017; van Deursen & Helsper, 2015; Waytz & Gray, 2018). According to this view, ICT can compensate for lower levels of social resources because connecting with social networks has become more equally accessible and more affordable due to ICT.

These opposing views of ICT, that is, as either an enhancer or a mitigator of inequalities in the social domain, are debated. A notable gap in this debate is that the family context is hardly addressed (Lythreath et al., 2022; Scheerder et al., 2017). I argue that there are at least two ways the family context can be relevant for digital divides. First, family relationships are both resources in and of themselves and harbor further social and material resources. The empirical question then arising is whether these resources are enhanced by ICT or whether a lack thereof is compensated with ICT. All the articles (I–IV) provide insight into this question. Second, digital divides can be transmitted within families, so that ICT use by the younger generation might drive outcomes in the older generation or the other way around (F.-C. Chang et al., 2015, 2016; Correa, 2014, 2015; Knitter & Zemp, 2020). Such intergenerational transmissions are addressed in Articles I and III. More specifically, Article I discusses the evidence of the effects of parental ICT use on children’s outcomes. Article III, on the other hand, addresses adult children’s social media use as a predictor of social media adoption in their older parents. These are relevant from the perspective of understanding the reasons behind digital inclusion and exclusion and social well-being among children (Camerini et al., 2018; Kaarakainen & Saikkonen, 2022) and aging populations (Chen & Schulz, 2016; Rosenberg & Taipale, 2022).

3 Earlier Research on ICT Use in Families

In this chapter, I review the research concerning ICT use in family relationships. First, I compile the available review articles and argue that an updated and more systematic review was warranted. Second, I provide an overview of the research relating to the various displacement hypotheses (in a summarized format because the more comprehensive review of the evidence is the substance of Article I). Third, I compile the relevant research on social media use, as both Articles III and IV focus on social media. In connection to social media use in family relationships, I review the evidence of the socioemotional selectivity theory, which is tested in Article IV in the context of social media. Last, I present the family-relevant evidence relating to digital divides; that is, I outline the ways in which ICT-related inequalities may manifest in the family context based on earlier evidence.

3.1 Reviews of ICT Use in Families

Of the reviews available concerning ICT and family relationships, many have focused on a specific type of hardware or software, such as social media (Dworkin et al., 2018; Imperato & Mancini, 2019; Rus & Tiemensma, 2017), video games (Costa & Veloso, 2016), or smartphones (Knitter & Zemp, 2020). Others have reviewed particular family relationships in isolation, such as the parent-child relationship (Kildare & Middlemiss, 2017; Knitter & Zemp, 2020) or romantic relationships (Eichenberg et al., 2017; Imperato & Mancini, 2019; Rus & Tiemensma, 2017; Vossler, 2016), and yet others have focused on the point of view of a particular family member such as an adolescent child (Hessel & Dworkin, 2017) or a parent (Coynne et al., 2017). Only three reviews have incorporated a range of ICTs as well as a range of family relationships (Carvalho et al., 2015; Hertlein, 2012; Sharaievska, 2017). Of these, two have taken a descriptive approach in reviewing the evidence (Hertlein, 2012; Sharaievska, 2017). They have selectively compiled evidence to describe aspects of family life and family practices that ICT has redefined, such as roles, boundaries, intimacy, and leisure. Notably, the most recent

study included in Hertlein's review was published in 2010, which means that social media and smartphones, were not yet represented in that review.

The most comprehensive synthesis of ICT and family outcomes that was available before the publication of our systematic review (Article I) was the review by Carvalho et al. (Carvalho et al., 2015). Their review incorporates a range of ICTs, and it takes a more systematic approach. Similarly to our approach in Article I, the review compiles relationship-level outcomes. The review finds three articles that reported negative and 19 that reported positive outcomes for family relationships. The positive outcomes were related to improvements in communication, while the few negative outcomes were related to ICT displacing time and attention in family settings. Again, it is important to note that the compiled studies were published between 1999 and 2013, which means that the most recent ICTs, such as smartphones and social media, are underrepresented.

The earlier reviews are valuable for identifying family-relevant aspects of ICT use and for exposing gaps in the literature. Notable gaps are that none of the reviews so far have synthesized the research using a documented systematic procedure. The systematic approach allows for more reliable interpretations of, for example, relationship-specific emphases in explored topics and unexplored territories. In addition, thus far, the reviews have not compiled evidence in relation to the displacement hypotheses and media richness theory (presented in Chapter 2), which, to date, provide the most frequently referenced theories explaining the mechanisms by which ICT affects family relationships. Last, the most prevalent ICTs of today (i.e., social media and smartphones) are underrepresented in the earlier reviews. To summarize, a contribution not yet made was to systematically address a range of family relationships together in a unified framework and to gather evidence of ICT's effects on family relationships focusing on a more recent time frame. This contribution is made in Article I.

3.2 Evidence of Displacement

Extensive reviews and meta-analyses have established that ICT use for personal purposes can adversely affect the users' immediate relationships – at least in non-family relationships (Nuñez & Radtke, 2023; Sbarra et al., 2019). Various hypotheses about the mechanisms through which ICT affects relationships negatively have been proposed. Next, I review the earlier evidence concerning three different displacement hypotheses and the media richness theory. The evidence for the time- and attention-displacement hypotheses, as well as the media richness theory, are presented in full in Article I, which is why the evidence is only summarized here. The evidence of the third kind of displacement hypothesis positing

displacement occurring between various communication methods is reviewed here in full and tested in Article II.

First, the time-displacement hypothesis, which posits that ICT has displaced family time and family activities, has not received much evidence (Hall et al., 2019, 2018; Vilhelmson et al., 2016). In fact, an extensive time-diary study from the United Kingdom provides compelling counterevidence (Mullan & Chatzitheochari, 2019). The study showed that the time family members spent together had not decreased: rather, families spent *more* time in the same location in 2015 than they did in 2000. Moreover, time spent on family activities had stayed the same. Therefore, it appears that time spent with family members has not been displaced, at least within households. (Notably, changes may have still occurred after 2015.)

The attention-displacement hypothesis, on the other hand, has received more substantial evidence showing that the use of ICT, indeed, displaces attention in offline social situations, undermining immediate personal interactions among non-family (Nuñez & Radtke, 2023; Sbarra et al., 2019). In family settings, too, numerous studies have shown that ICT use can displace meaningful family interactions and negatively affect relational well-being (McDaniel, 2015; McDaniel & Coyne, 2016a, 2016b; McDaniel & Drouin, 2019; McDaniel et al., 2017; McDaniel & Radesky, 2018a, 2018b). Notably, attention displacement applies to both children's and parents' attention. In the latter case, negative effects have been established not only in the immediate parent-child interaction but also in the child's development, suggesting that parental ICT use may have repercussions that transcend the immediate social situation (McDaniel & Radesky, 2018a, 2018b; Radesky et al., 2018, 2015).

The third proposed type of displacement by ICT occurs in relation to other communication methods, as posited in the niche theory. According to the niche theory, newer media displace older methods of communication if they gratify the same needs more efficiently. Conversely, if the newer media gratify distinct needs, the newer methods can co-exist with the older methods (i.e., both occupy their own niche) (Dimmick et al., 2000; Dimmick & Rothenbuhler, 1984; Ramirez et al., 2008). Evidence on whether ICT has occupied a separate niche or displaced older methods of communication is mixed. On the one hand, it has been proposed that ICT may have displaced face-to-face interaction because an array of social activities, such as sharing content, coordinating, discussing events, and engaging in social validation, are carried out more efficiently with ICT (Dienlin et al., 2017). Moreover, numerous statistics show a declining trend of face-to-face interaction, which has temporally coincided with the proliferation of social media and smartphones (Hanifi, 2019; OSF, 2021; Twenge et al., 2019). These suggest that ICT may have displaced face-to-face interaction.

In stark contrast, studies that have actually tested whether displacement occurs between digital communication and other means of communication (e.g., meeting face-to-face) have not found evidence of displacement. Rather, it appears that various forms of communication are complemented with digital means (Ahn & Shin, 2013; Dienlin et al., 2017; Fortunati et al., 2013; Verduyn et al., 2021). While these studies have focused on non-family contexts, numerous studies indicate that family contexts follow the same logic. For example, interview studies from around Europe and the US show that families perceive ICT to have complemented overall communication in their families (Storch & Ortiz Juarez-Paz, 2019; Taipale, 2019). Furthermore, families use ICT in ways that do not compete with face-to-face interaction. For example, ICT enables staying in touch with family members at times when face-to-face meetings are not possible (Abel et al., 2021; Baldassar et al., 2016; Li et al., 2022; Neves et al., 2017; Storch & Ortiz Juarez-Paz, 2019; Taipale, 2019) and ICT is used for coordination and reassurance at times of short-term separation (Storch & Ortiz Juarez-Paz, 2019; Taipale, 2019). Therefore, in family communication, ICT may occupy a separate, complementary niche without displacing other methods of communication.

In addition to the above findings, two quantitative studies from China also do not find evidence of displacement in the family context, showing that communication via ICT is positively associated with face-to-face contact (Li et al., 2022; Shen et al., 2017). However, it is important to consider that these studies are based on Chinese populations and, therefore, represent a collectivistic culture. Collectivistic ideals include that families have a stronger influence on individuals' behavior, which may impact communication patterns. Conversely, Finland represents a Western individualistic culture with looser family ties (Danielsbacka et al., 2020). Especially in light of the statistics about declining social interaction in Finnish families (Hanifi, 2019), it is plausible that digital communication is differently related to traditional communication in the Finnish context.

Whether digital communication in family relationships has displaced other methods of communication in the Finnish context is addressed in Article II. Understanding this relationship is relevant from the point of view of the media richness theory. The media richness theory posits that "rich" methods of communication, such as face-to-face communication, support intimate relationships better than "less rich" digital communication. In other words, Article II tests whether "less rich" methods of communication have displaced "richer" methods. Earlier applications of the media richness theory suggest that the displacement of "rich" communication impacts the quality of relationships (Goodman-Deane et al., 2016; Lindell et al., 2015; Shen et al., 2017; Wang et al., 2015). Furthermore, in the case of young individuals, the displacement of "rich" face-to-face interaction by ICT may have adverse developmental effects (Uhls et al., 2014).

3.3 Predictors of Social Media Adoption

One of the most widely and frequently used ICTs is social media. The majority of Finnish adults under the age of 55 are active social media users (Hanifi, 2019) and social media adoption continues to grow, in particular, among older adults (Vogels, 2019).

Despite the popularity of social media, some individuals remain non-adopters. Older age has been widely recognized as one of the most prominent predictors of social media non-use (Bell et al., 2013; Gaia et al., 2021; Hutto et al., 2015; Newman et al., 2019; Sheldon, 2012; Yu, 2020; Yu et al., 2016). Also established in many previous studies is that men and those less educated are underrepresented among social media users (Bell et al., 2013; Hutto et al., 2015; Newman et al., 2019; Richter et al., 2013; Yu et al., 2016).

In addition to demographic predictors, a major factor in social media adoption, especially among older adults, may be the influence of family. Indicative evidence of this is abundant. For example, older adults themselves most often mention younger family members as their primary motivation for using social media (Aarts, 2018; Nef et al., 2013; Newman et al., 2019; Yu, 2020; Zickuhr & Madden, 2012). Furthermore, children and grandchildren may actively encourage their parents and grandparents to adopt social media, and provide the needed assistance (Aarts, 2018; Bell et al., 2013; Friemel, 2016; Hänninen et al., 2021; Jung et al., 2017; Yu, 2020). As a side note, ICT adoption – although treated in this thesis as a dichotomous yes-or-no phenomenon – can also take in-between forms. In this vein, the literature on *proxy use* (i.e., ICT use on behalf of someone else) (Hänninen et al., 2018, 2021; Reisdorf et al., 2021) is relevant but falls beyond the scope of this thesis as the data and materials used do not capture such forms of use. Conversely, themes that thematically overlap with proxy use, such as co-use (i.e., using ICT together with a family member) and intergenerational transmissions (i.e., the fact that ICT use by members of the same family tends to be similar), are discussed at length in this thesis.

Taken together, the evidence suggests that for older adults, relationships with children and grandchildren may be a gateway into social media and ICT adoption more generally. Conversely, those who do not have children or grandchildren, or are not close to them, may be less likely to use social media and may even be at risk for more major digital exclusion. While the role of children has been studied in relation to ICT uptake more generally in a few studies (Correa, 2014, 2015; Eynon & Helsper, 2015), their role as predictors of social media adoption has not been studied. This question is addressed in Article III.

In addition to close family, friends and other characteristics of social networks (e.g., network size and diversity) may also promote ICT use (Chen, 2013). On the one hand, active and diverse social networks have been found to promote social media use (Liu et al., 2016; Yu et al., 2016). This aligns with the view discussed

earlier that ICT *complements* other forms of communication. On the other hand, there is also evidence showing that ICT is used to compensate for the *lack* of social contacts, for example, among widows, homemakers, and older adults with declining social networks (Chen & Schulz, 2016; Hutto et al., 2015; Nguyen et al., 2020; Simons et al., 2021; Yu et al., 2016).

Taking these perspectives into account, Article III considers a range of characteristics of respondents' social lives as possible predictors of social media (non-)adoption. As such characteristics of social lives and communication patterns are life-stage specific (David-Barrett et al., 2016; Robinson et al., 2015), the article also examines adults in different life-stages separately in order to capture life-stage specific changes in social networks.

3.4 Social Media, Family, and Well-being

The relationship between social media and well-being is debated (Verduyn et al., 2017). Some argue that online social interaction is better suited for superficial communication and does not provide psychological benefits equivalent to those derived from face-to-face interaction (Turkle, 2011; Waytz & Gray, 2018). Others emphasize the potential of social media to complement communication in close relationships and ultimately serve users' well-being (Cornejo et al., 2013; Dienlin et al., 2017; Erickson, 2011; Simons et al., 2021).

Older adults, in particular, have been found to use social media in ways that increase their well-being (Chan, 2015, 2018; P. F. Chang et al., 2015). The key difference may be that older adults use social media to communicate with a smaller number of close relationships, that is, close friends and family, while younger adults use social media to connect with larger and looser networks (Brandtzaeg et al., 2010; Hutto et al., 2015; Kim & Shen, 2020). These findings align with the socioemotional selectivity theory, which posits that older adults selectively direct their communication efforts toward a small number of emotionally gratifying relationships (Carstensen et al., 1999; Löckenhoff & Carstensen, 2004; Sims et al., 2017; Wrzus et al., 2013). Notably, while the socioemotional selectivity theory has received support in the context of social media, a notable shortcoming is that the studies have not differentiated family from friends (Brandtzaeg et al., 2010; Chan, 2018; P. F. Chang et al., 2015; Neves, 2015; Wrzus et al., 2013). This gap is addressed in Article IV, which tests whether social media contact with family increases happiness among younger and older adults. Based on the socioemotional selectivity theory, older adults' social media communication with family members is expected to be associated with happiness.

3.5 Does ICT Reinforce or Mitigate Inequalities in the Family Context?

A spate of research indicates that ICT can accelerate inequalities, so those with prior advantages benefit more from ICT (Blank & Lutz, 2018; Büchi et al., 2016; Gran et al., 2021; van Deursen & Helsper, 2015). For example, an individual with a well-functioning social network can use ICT to extract further value from that network. Correspondingly, other studies have shown that those with prior disadvantages are more prone to experience harms, such as harms relating to excessive use (Gui & Büchi, 2021; Hartshorne et al., 2021; Määttä et al., 2017), compromised security (Rainie et al., 2013), and digital exclusion (Choi & Dinitto, 2013; Courtois & Verdegem, 2016; Helsper, 2012). Taken together, these studies suggest that ICT may widen pre-existing inequalities.

In opposition, some have argued that ICT can mitigate inequalities instead of reinforcing them in some cases. This view has received support in studies focusing particularly on the social domain (Büchi et al., 2016; O’Leary & Volkmer, 2021; Rains & Tsetsi, 2017; van Deursen & Helsper, 2015; Waytz & Gray, 2018). More specifically, these studies have identified particular groups among which ICT can mitigate disadvantages. For example, there is evidence that individuals with weak prior social networks (Rains & Tsetsi, 2017; Waytz & Gray, 2018); widows and homemakers (Yu et al., 2016), and older adults who have declining social networks (Chen & Schulz, 2016; Hutto et al., 2015; Nguyen et al., 2020; Simons et al., 2021) can benefit from the affordable and efficient access to social support provided by ICT. Adding to this, some studies have found that socioeconomic differences among users do not predict differences in ICT use for social purposes to the same extent as they predict differences in ICT use for economic and informational purposes (Büchi et al., 2016; van Deursen et al., 2014). In other words, these studies show that socioeconomic background less clearly determines ICT use for social purposes and its social outcomes. This, however, has also been contradicted by some other studies that have found that higher socioeconomic status *does* predict ICT use for social purposes in core networks (Hampton & Ling, 2013; Li et al., 2022; Rosenberg & Taipale, 2022; Shen et al., 2017).

In the digital divide research, the family context has received little attention (Lythreathis et al., 2022; Scheerder et al., 2017). Family has been mostly lumped together with non-family rather than being investigated separately (Nguyen et al., 2020; Rains & Tsetsi, 2017; Yu et al., 2016), which means that several essential aspects of family relationships have been overlooked.

First, as the theoretical considerations (presented in Chapter 2) suggest, distinct evolved predispositions uphold family and non-family relationships (Hamilton, 1964; Trivers, 2002) and, therefore, it is possible that ICT influences family and friends differently (Li et al., 2022; Nuñez & Radtke, 2023). Furthermore, the

evolutionary approach suggests that each relationship type and life stage has its distinct dynamics. In relation to digital divides, these considerations imply that there may be important differences in the extent to which ICT benefits an individual in the social domain, depending on whether the individual's network includes friends or family and the types of family members it includes.

Second, family contexts are unique because effects are transmitted and accumulate within families, whereas, in friendship networks, this is less apparent. For example, parents' ICT use and skills affect the ICT practices that the child adopts (Hefner et al., 2019; Määttä et al., 2017; Nikken & Oprea, 2018), and this can have far-reaching repercussions in the child's life, including in their academic performance and digital inclusion (Camerini et al., 2018; Kaarakainen & Saikkonen, 2022).

Intergenerational transmissions also occur in the other direction (Correa, 2014, 2015; Hänninen et al., 2021). For example, older adults may depend on support from their children in their ICT use. Such support may be a crucial factor in digital divides because those who have family members (especially younger ones) and receive support from them are more likely to adopt ICT and use ICT in diverse ways (Aarts, 2018; Bell et al., 2013; Jung et al., 2017; Nef et al., 2013; Newman et al., 2019; Yu, 2020; Zickuhr & Madden, 2012). Conversely, those lacking such family resources may risk becoming isolated from the digitalizing society.

In sum, I have presented evidence showing how ICT can mitigate inequalities in some circumstances and reinforce them in others. In all of the articles (I–IV), I provide further evidence on this matter with a focus on the family context. In addition, I have suggested that intergenerational processes contribute to digital divides. Further evidence of such processes is provided in Articles I and III, which examine intergenerational effects. In Chapter 7, I return to discuss what the results offer with respect to digital divides in the family context.

4 Aims of the Thesis

This thesis has empirical aims and a theoretical aim. First, I aim to empirically examine ICT use in families and its effects on family relationships. Four studies (Articles I–IV) were conducted toward this aim. Second, the findings from these studies are interpreted through a lens of digital inequalities by discussing whether the findings support a view of ICT use in families as either a reinforcing or mitigating force in inequalities. With this theoretical extension beyond the empirical sections, I aim to address the lack of family perspectives in the digital divide discourse and link the thesis to a broader discussion about societal inequalities.

Besides these overarching aims of the whole thesis, the independent studies have the following more specific aims (also summarized in Table 1):

Aims of Article I. The objective of Article I is to form a robust base for the empirical part of the thesis by systematically compiling and reviewing the research on how ICT affects family relationships. Both the systematic approach and the chosen time span addressed in the review (2009–2019), which captures “the decade of social media and smartphones,” contribute to its robustness. The systematic review answers two research questions:

- 1) What positive and negative outcomes for family relationships are associated with ICT use?
- 2) What are the relationship-specific phenomena and outcomes associated with ICT use in families?

In relation to digital divides, the relevant question to which Article I can provide an answer is how the positive and negative impacts of ICT use for families are distributed and whether they are selectively or randomly distributed across different kinds of families, life stages, and family relationships.

Aims of Article II. Article II tests whether digital communication (i.e., video calls, instant messages, social media, and email) displaces or reinforces traditional communication (meeting face-to-face, phone calls, and sending/receiving letters or postcards) in a range of family relationships. The displacement hypothesis predicts a negative association between digital and traditional communication (i.e., that

digital communication displaces traditional communication), whereas the reinforcement hypothesis predicts a positive association (i.e., that digital communication increases traditional communication). The following kin-dyads are examined separately: parent-child, grandparent-grandchild, siblings, aunt/uncle-niece/nephew, and adult children with their parents-in-law. By examining the relationship types separately, the study aims to reveal possible differences between relationships in how digital and traditional communication relate to each other.

The relevant question concerning digital divides is whether those who communicate frequently using one method are also more likely to make use of other methods (i.e., whether the “rich-get-richer” principle applies to communication in family relationships).

Aims of Article III. Article III aims to identify factors that explain the adoption and non-adoption of social media with a specific interest in how differences in social network characteristics affect social media adoption among older adults (68–74 years). In addition, the article investigates whether social media use in a parent representing the older generation is predicted by social media use in their adult children. In terms of digital divides, this question can also be reformulated as: Does ICT adoption transmit intergenerationally so that older adults’ social media adoption depends on whether they have adult children who use social media?

Like in Article II, by investigating whether those with social support are more likely to use social media, we can determine whether a “rich-get-richer” principle applies to social media adoption. Conversely, if those with less social support are less likely to be social media users, the article identifies factors that may increase the likelihood of digital exclusion.

Aims of Article IV. Article IV tests whether social media contact (SMC) with family members is a source of happiness for younger and/or older adults. By applying a propensity score matching (PSM) approach (a quasi-experimental method for non-experimental data), we aim to improve the credibility of the causal interpretation.

Regarding digital divides, the aim is to understand whether those with the advantage of having family relationships may further benefit from ICT by using social media to communicate with family members. This question is especially salient in the case of older adults, as social networks tend to decline with age, and family ties become more significant sources of social support.

Table 1. Summary of the research questions, materials/data, and analytical strategies in each of the articles (I–IV).

ARTICLE	Research questions	Materials/data and sample	Analytical strategy
I	<ul style="list-style-type: none"> • What outcomes for family relationships are associated with ICT use? • Are those outcomes relationship specific? 	<ul style="list-style-type: none"> • 73 peer-reviewed studies on ICT's effect on family relationships 	<ul style="list-style-type: none"> • Systematic database search • Synthesis of the research results categorized by ICT use type (independent variable) and family relationship type
II	<ul style="list-style-type: none"> • Does ICT-mediated communication displace or reinforce traditional means of communication in family relationships? 	<ul style="list-style-type: none"> • Gentrans 3rd wave¹: $N = 1,945$ 19–56-year-olds (i.e., younger generation) and 2,663 68–74-year-olds (i.e., older generation) 	<ul style="list-style-type: none"> • Linear regression to predict the frequency of traditional communication based on digital communication • A range of kin dyads were analyzed separately.
III	<ul style="list-style-type: none"> • What are the predictors of social media adoption generation-specifically? • Does adult children's social media use predict their parents' social media adoption? 	<ul style="list-style-type: none"> • Gentrans 3rd wave¹ (see above) • Merged sub-samples consisting of parents from the older generation and their adult children from the younger generations to study the within-family effect: $N = 1,003$ clusters 	<ul style="list-style-type: none"> • Logistic regression to predict the likelihood of being a social media user based on demographics and characteristics of social networks • With the merged sample, the social media use of an adult child was used to predict the social media adoption of their parents.
IV	<ul style="list-style-type: none"> • Does social media contact with family members increase happiness? 	<ul style="list-style-type: none"> • Sub-sample from the Gentrans 3rd wave¹ data consisting of social media users: $N = 1,542$ 19–55-year-olds and 1,265 68–73-year-olds 	<ul style="list-style-type: none"> • Linear regression and propensity score matching approach to predict happiness based on social media contact (yes/no) with a family member • A range of kin dyads were analyzed separately.

¹Generational Transmission in Finland (Gentrans) survey consisting of data from two family generations; 3rd wave compiled in 2018/2019

5 Materials and Methods

This thesis leans on two distinct methodological approaches. Article I extracts knowledge from existing studies by systematically searching and reviewing published research. Articles II–IV, on the other hand, use Finnish survey data and statistical methods. The materials offer two distinct perspectives on the topic. For example, the relationship types studied in Article I concentrate on within-household relationships, whereas the survey data used in Articles II–IV focus mainly on the extended family. Furthermore, Article I addresses a range of ICT uses, whereas Articles II–IV focus on communication via ICT. Last, Article I provides a more global perspective, whereas Articles II–IV focus on Finland only.

In the following, I give an overview of the methods and materials used in the articles. Further details are provided in the original articles. The methods and materials are also summarized at the end of the previous chapter (Table 1). In addition, a summary of the specific variables and the relationship types examined in each of the articles is provided at the end of this chapter in Table 3.

5.1 Database Search Sample and Systematic Review

A systematic search into four academic databases was performed in June 2019 using family- and ICT-related keywords (Table 2). The search procedure was documented. Criteria for inclusion were that the studies included an ICT use variable (e.g., social media use, internet use, playing video games) as an independent variable and a family-relationship construct (e.g., intimacy, conflict, relationship satisfaction) as a dependent variable (see Table 2 and Article I for more details). Other criteria for inclusion were that the studies were in English, used quantitative statistical methods, and were published between 2009–2019.

After narrowing down the search results by a number of refined criteria (documented in Article I) and identifying additional studies via reference lists, citation searches, and other sources (reviews and books), 73 studies were synthesized and reviewed.

The eligible articles studied a range of ICT uses, which were categorized based on the social context of the ICT use: personal use, technofence, communication,

and/or co-use. Eligible dependent variables were emotional (e.g., relationship satisfaction, intimacy), behavioral (e.g., infidelity and divorce), or functional (e.g., time spent together and number of interactions) relationship constructs. The relationship types studied were: romantic relationships, parent-child relationships, siblings, and unspecified family relationships. Other relationship types were not represented in the sample. Notably, the studies mostly, although not exclusively, studied within-household family relationships (the relationship types addressed are listed in Table 3).

Table 2. Family- and ICT-related search terms and databases used in the search in the systematic review (Article I).

Family-related terms	ICT-related terms	Databases
Family ¹	ICT / Information and communication technology	Ebsco / Academic search complete
Intergenerational ¹	Smartphone	Web of Science
Parent-child	Screen time	PsycINFO
Parent-infant	Mobile media	Proquest / Central
Parent-adolescent	Internet	
Parental ¹	SNS / Social networking site	
Marital	Social media	
Couple	Social networking	
Partner	Gaming	
Grandparent ¹	Technoference	
Sibling ¹	Phubbing ²	

¹ Truncated in order to retrieve derivatives, e.g., Famil* to retrieve Family, Familial

² Not recognized by the search engines

5.2 Gentrans surveys

Articles II–IV use the population-based Generational Transmissions in Finland (Gentrans) survey data and statistical methods. Gentrans is a reoccurring survey that has documented the living conditions, social networks, and well-being of the Finnish Baby Boomer generation (born 1945–1950) and their adult children (born 1964–1999) (<https://www.vaestoliitto.fi/tutkimus/ikaantyminen-ja-sukupolvvet/sukupolvien-ketju/>).

The Gentrans survey has been administered in three waves so far. The third wave was the first to collect detailed information about digital communication and ICT use. Therefore, Articles II–IV utilize the third-wave data. The data collection in each wave has been carried out by Statistics Finland. The third wave was collected in

2018 and 2019. Ethical permission for the Gentrans surveys was granted by the Ethical board of Statistics Finland in 2006. The data have been anonymized, and informed consent has been expressed by the respondents. In addition, the users of the data commit to the Statistics Finland ethical rules by signing The Pledge of Secrecy of Holder of Permission to Use Data.

The Gentrans surveys are posted self-administered questionnaires, which can also be accessed and submitted online. The response rates for the third wave were 66.4% for the older generation and 55.6% for the younger generation. (Hämäläinen et al., 2021).

The third-wave data comprise a nationally and geographically (excluding Åland) representative sample of 1,945 younger and middle-aged adults who were aged 19–56 years at the time of the data collection (mean = 42, SD = 5.86; i.e., the younger family generation) and 2,663 older adults who were aged 68–74 years (mean = 71, SD = 1.70; i.e., the older family generation). As an additional feature, these two samples capture 1,003 sets of individuals who are related (i.e., parents and their adult children). Therefore, the Gentrans data enable integration of responses acquired from the same families (this feature is utilized in Article III).

Contrary to the systematic review, most of the relationships studied in the Gentrans survey transcend households. The main reason for this is that the studied population is older, and older people are less likely to live in the same household with their siblings or children. The relationship types addressed in Articles II–IV are listed in Table 3. Next, I describe how the data were used and analyzed in Articles II–IV.

In Article II, we tested how digital communication (i.e., social media, instant messages, email, and video calls) relates to traditional communication (i.e., meeting face-to-face, phone calls, and sending/receiving letters or postcards) across a range of family relationship types (listed in Table 3). We analyzed the association between digital contact and traditional forms of contact with linear regression. Because the relationship between digital contact and the three methods of traditional contact may each be different (e.g., digital contact might increase phone calls but decrease meeting face-to-face or the other way around), we postulated three separate regressions for the three different dependent variables (face-to-face contact, contact by phone, and contact by letter or postcard).

As an additional sensitivity analysis, we tested whether changing the independent variable into a categorical variable in the linear regressions would reveal non-linear associations. However, no clear non-linear patterns emerged, that is, the relationship between digital and traditional forms of contact was consistent throughout the range of values of contact frequencies.

In Article III, we determined the factors that predict social media adoption (yes/no). As predictors, we considered demographic variables and indicators characterizing the respondents' social lives (i.e., the number of close friends and

relatives and contact frequencies with them). The respondents were given the following examples of social media to guide their responses: Facebook, Instagram, Twitter, and Snapchat. We examined the family generations separately in order to determine the generation-specific predictors of social media adoption. As an additional predictor for the older family generation, we investigated whether the social media use of the adult children from the younger family generation sample predicted their parents' social media adoption.

For the analyses, we used logistic regressions. We ran the analyses separately for the two family generations. In addition, we tested interaction effects to see whether the associations between the predictors and social media adoption differ depending on gender or which family generation the respondent represented.

Last, we investigated the intergenerational effect, that is, whether social media adoption among respondents representing the younger family generation predicted the social media adoption of their parents from the older family generation. To study the intergenerational effect, the datasets were combined so that the data included one parent and one adult child from the same family. Notably, such data consist of non-independent observations (i.e., the responses of parents and their children are not independent and tend to correlate with one another). Therefore, we used the statistical software Stata's (version 16.1) cluster option to compute the standard errors. The clustered standard errors take into account that the observations within clusters are non-independent. With this procedure, accepting non-significant results as significant is less likely.

In Article IV, we studied whether social media contact (SMC) with family members is associated with happiness. We focused only on those who were social media users and performed the analyses on a range of family members separately (list of relationship types in Table 3). Three estimates of the associations between the main variables were presented for each family member type: 1) regression without controls, 2) regression with controls, and 3) propensity score matching (PSM) approach (Rosenbaum & Rubin, 1983). As control variables (in both the regression with controls and the PSM), we included common background variables and, in addition, the number of children and number of close friends. This is because having close friends and relatives is associated with both the independent variable (SMC) and the dependent variable (happiness).

First, the regressions showed whether there is an association between SMC with a family member and happiness and whether the association is a matter of selection (i.e., whether those who are happier due to factors accounted for by the control variables also sustain SMC with family members). After the regressions, the PSM approach was used to improve the credibility of causal inference. PSM is a quasi-experimental method, which is based on retrospectively forming comparable groups ("treatment" and "control") from existing data. We formed a "treatment group" from

those with SMC with a given family member and a “control group” from those who do not have SMC with that given family member. The PSM method allows estimation of the counter-factual happiness of respondents had they belonged to the other group by matching respondents from the “treatment” and “control” groups based on the control variables (the same control variables as in the linear regression).

Table 3. Summary of the independent and dependent variables studied in Articles I–IV and the relationship types included in each article.

ARTICLE	INDEPENDENT VARIABLE(S)	DEPENDENT VARIABLE(S)	RELATIONSHIP TYPES
I	<ul style="list-style-type: none"> • Personal use¹ • Technoference² • Communication³ • Co-use⁴ 	<ul style="list-style-type: none"> • Relationship-level constructs including emotional (e.g., relationship satisfaction, intimacy, and jealousy), behavioral (e.g., infidelity and divorce), and functional constructs (e.g., time spent together and number of interactions) 	<ul style="list-style-type: none"> • Romantic relationship • Parent-child • Siblings • Unspecified family relationships
II	<ul style="list-style-type: none"> • Frequency of digital communication: instant messages, email, social media, and video calls 	<ul style="list-style-type: none"> • Frequency of traditional communication: meeting face-to-face, phone calls, sending/receiving letters/postcards 	<ul style="list-style-type: none"> • Mother/father-son/daughter • Maternal/paternal grandparent-grandchild • Brother/sister • Aunt/uncle-niece/nephew • Mother/father-in-law
III	<ul style="list-style-type: none"> • Demographic variables • Social network characteristics (i.e., number of children and close friends and contact frequency with them) and social media adoption of the child 	<ul style="list-style-type: none"> • Social media adoption (yes/no) 	<ul style="list-style-type: none"> • Parent-child (used as the relationship context for testing the within-family effect and also considered as one of the predictors)
IV	<ul style="list-style-type: none"> • Social media contact with a given family member (yes/no) 	<ul style="list-style-type: none"> • Self-rated happiness 	<ul style="list-style-type: none"> • Mother/father-son/daughter • Brother/sister • Grandparent-grandchild

¹ Measured as duration, frequency, or intensity of use, subscription rates, or number of media used

² ICT use in the presence of a family member

³ Measured as communication frequencies, medium used, or number of media

⁴ Co-playing video games, co-viewing digital content, augmenting a shared offline activity with ICT

6 Results and Discussion

In this chapter, I present the main findings of each of the articles in their respective order as well as discuss the findings in relation to the literature. A separate discussion of the implications of the main results for digital divides (i.e., inequalities related to ICT) follows in Chapter 7. A summary of the main findings and their implications for digital divides is additionally provided in Table 5 at the end of Chapter 7.

6.1 Article I – Effects of ICT on Family Relationships

Article I is a systematic review of the quantitative research on ICT use in families and the associated outcomes for family relationships published in 2009–2019. The systematic search yielded 70 peer-reviewed articles (73 studies). The studies were categorized by relationship type and ICT use type. Table 4 shows the distribution of the studies in each category.

The relationship types reviewed in Article I are: romantic relationships (40 studies), parent-child relationships (21 studies), siblings (2 studies), and unspecified family relationships (10 studies). Other relationship types were not retrieved in the search. The ICT use types studied are: a) personal use, b) technoference (i.e., the use of ICT for personal purposes in the presence of a family member) (McDaniel, 2015), c) communication between family members, and d) co-use of ICT (i.e., ICT use by two or more family members together). This categorization emerged from the retrieved studies, but similar aspects of ICT use have also been recognized earlier as consequential for family relationships (Hodge et al., 2012).

Next, I describe the studied ICT use types and summarize and discuss the results on how the ICT use types affect the different family relationships. I highlight, where possible, the proposed and tested mechanisms by which ICT affects relationships. The comprehensive synthesis listing the details of all the reviewed studies is presented in Article I.

Table 4. Number of studies by independent variable (ICT use) type and relationship type in the systematic review (Article I).

Categories	Romantic relationship	Parent-child	Sibling	Unspecified family relationship
a) Personal use	22	7	-	6
b) Technoference	12	6	-	-
c) Communication	7	6	1	5
d) Co-use	3	6	1	3

a) Personal ICT use was measured in the reviewed articles as the frequency, extent, or intensity of ICT use for personal purposes, subscription rates, login frequencies, or number of devices in use. As these measures capture overall use, this category likely includes behaviors from the other categories (technoference, communication, and co-use). Keeping this in mind, the personal use category serves as a valuable indicator of the relative prevalence of use types associated with positive and negative outcomes in relation to the overall extent of use.

The subjects in the studies ranged from individuals and dyads to families and populations.

The studies reported mostly negative outcomes. Personal ICT use was associated with poorer family functioning (Capri et al., 2019; Carvalho et al., 2017, 2018; Hodge et al., 2012; Williams & Merten, 2011) and displaced time and closeness between family members (Williams & Merten, 2011). Romantic relationships had been studied the most, and this relationship type showed negative outcomes most conspicuously (Amichai-Hamburger & Etgar, 2016; Coyne et al., 2012, 2017; Daspe et al., 2018; Dew & Tulane, 2015; Halpern & Katz, 2017; Hand et al., 2013; Valenzuela et al., 2014). Notably, most of the negative outcomes in romantic relationships displayed the unique stress for romantic relationships posed by social media and the access to alternative (actual or imagined) partners that it provides. Social media use in romantic relationships was associated with outcomes such as jealousy, infidelity, and (the prospect of) relationship dissolution (Clayton, 2014; Clayton et al., 2013; Coyne, McDaniel, et al., 2016; Daspe et al., 2018; Elphinston & Noller, 2011; Hand et al., 2013; Muise et al., 2009; Nongpong & Charoensukmongkol, 2016; Utz & Beukeboom, 2011; Valenzuela et al., 2014; Zheng et al., 2019).

The proposed mechanisms by which personal use of ICT may undermine relationship quality were: displacement of face-to-face interaction (McDaniel, 2015), time displacement, i.e., time spent with screens is time *not* spent on intimacy-building activities (Coyne et al., 2014), and finally, conflict (Halpern & Katz, 2017). In addition, the most prominent proposed mechanism that affects romantic

relationships was access to alternative romantic partners (actual or imagined) via ICT, especially social media (Clayton, 2014; Clayton et al., 2013; Coyne, McDaniel, et al., 2016; Daspe et al., 2018; Elphinston & Noller, 2011; Hand et al., 2013; Muise et al., 2009; Nongpong & Charoensukmongkol, 2016; Utz & Beukeboom, 2011; Valenzuela et al., 2014; Zheng et al., 2019). The findings concerning romantic relationships align with earlier reviews (Imperato & Mancini, 2019; Rus & Tiemensma, 2017).

Some studies also reported positive outcomes from personal ICT use. However, these findings were clearly attributable to the benefits of facilitated communication (described as a separate category below) even though the studies technically represented the personal use category (Amichai-Hamburger & Hayat, 2011; Williams & Merten, 2011). In a similar vein, technoference (also described below) may account for some, or even most, of the above negative findings in the studies of personal use since studies have rarely addressed personal use separately from technoference. Whether personal use, per se, has independent effects on family relationships is unclear. The time-displacement hypothesis has offered a plausible mechanism, i.e., using ICT for personal purposes has displaced time spent with family members. The time-displacement hypothesis, however, has received little support (Hall et al., 2019, 2018; Mullan & Chatzitheochari, 2019; Vilhelmson et al., 2016).

b) Technoference refers to the use of personal devices in the presence of family members (McDaniel, 2015). An example of technoference is the use of devices during family meals (Nelson, 2019). Another term used for the same behavior is *phubbing* (phone + snubbing) (Nuñez & Radtke, 2023; Roberts & David, 2016). Additionally, three studies were included which did not use the terms technoference or phubbing but defined the behavior accordingly (Amichai-Hamburger & Etgar, 2016; Leggett & Rossouw, 2014; Nongpong & Charoensukmongkol, 2016).

The studies on technoference demonstrate both that the behavior is increasingly salient in family settings (Mullan & Chatzitheochari, 2019) and that in parent-child and romantic relationships, it is associated with negative outcomes, such as conflicts, lower relationship satisfaction, and less closeness (Amichai-Hamburger & Etgar, 2016; Halpern & Katz, 2017; Kushlev & Dunn, 2019; Leggett & Rossouw, 2014; McDaniel & Coyne, 2016a, 2016b; McDaniel & Drouin, 2019; McDaniel et al., 2017; McDaniel & Radesky, 2018a, 2018b; Nelson, 2019; Roberts & David, 2016; Wang et al., 2017). Of these studies, the study by Halpern and Katz (2017) is worth highlighting as it employed a longitudinal study design and found evidence of a causal effect of technoference on perceived relationship quality in romantic relationships. The same has also been established in a later longitudinal study (Zoppolat et al., 2022). These studies demonstrated that it is, indeed, ICT that lowers relationship quality over time, rather than that those in lower-quality relationships

are more prone to engage in technofence (although the effects may also be bidirectional). Both of the studies also found evidence of attention displacement and conflict being mediators between ICT use and lower relationship quality.

Besides the negative effects listed above, which apply across family relationship types, one study reported romantic relationship-specific stressors in relation to technofence. This study – similarly to the case of personal use described above – reported technofence in romantic relationships to be associated with infidelity and jealousy (Nongpong & Charoensukmongkol, 2016).

c) Communication between family members was measured as contact frequency via ICT, the number of different media used for communication, and proportion of communication mediated by a specific medium out of overall communication. In addition, the research design in over half of the studies (12 out of 21) was one that compared two or more communication methods in how they relate to relationship outcomes. Comparisons pertained to phone calls, text messages, social media, email, instant messages, video calls, and face-to-face communication.

Studies comparing communication methods in family relationships found that, while face-to-face communication is associated with positive relationship characteristics most clearly (Bevan, 2017; Boyle & O’Sullivan, 2016; Goodman-Deane et al., 2016), digital methods resembling face-to-face interaction, such as video and phone calls, are also associated with positive relationship characteristics more strongly than the text-based alternatives (Jin & Peña, 2010; Lindell et al., 2015; Schade et al., 2013; Shen et al., 2017; Wang et al., 2015). Conversely, text-based alternatives such as email and social media are less obviously related to positive relationship outcomes (Gentzler et al., 2011; Jin & Peña, 2010; Lindell et al., 2015; Padilla-Walker et al., 2012; Ramsey et al., 2013; Schade et al., 2013). Notably, despite being text-based, instant messages are associated with positive outcomes for relationships, possibly due to their ability to create a synchronous sense of “connected presence” (Cui, 2016).

Generally, these findings on communication via ICT are in line with the earlier literature suggesting that in communication, “more is more”; that is, that digital communication methods complement other methods of communication (Carvalho et al., 2015; Hodge et al., 2012; Taipale, 2019). However, our results highlight that not all media are equal; face-to-face interaction and media that resemble face-to-face communication are more clearly associated with positive relationship characteristics than, for example, text-based alternatives. Moreover, several studies show that although communication via ICT can be a good supplement, it is a poor substitute for face-to-face communication (Bevan, 2017; Boyle & O’Sullivan, 2016; Morey et al., 2013).

The results support the media richness theory across all studied family relationship types (Daft & Lengel, 1986; Goodman-Deane et al., 2016). More

specifically, the results show that face-to-face communication followed by phone calls and video calls are most clearly associated with relationship quality, whereas text-based and asynchronous alternatives such as email and social media are least associated with positive relationship outcomes (Gentzler et al., 2011; Goodman-Deane et al., 2016; Jin & Peña, 2010; Lindell et al., 2015; Morey et al., 2013; Ramsey et al., 2013; Shen et al., 2017; Wang et al., 2015).

As a major shortcoming, all the reviewed communication studies are based on cross-sectional data and, therefore, the alternative causal direction (i.e., that richer communication methods are preferred in relationships that are already closer and better functioning) cannot be ruled out.

d) Co-use refers to ICT use together with one or more family members. Examples of co-use in the reviewed studies are co-playing video games (Ahlstrom et al., 2012; Coyne et al., 2011; Wang et al., 2018), sharing entertainment media (Coyne et al., 2014; Gomillion et al., 2017; Hodge et al., 2012), joint internet use (Festl & Gniewosz, 2019; Williams & Merten, 2011), and using ICT to enhance some other joint activity (Kushlev & Dunn, 2019). In addition, some studies consider it a form of co-use when parents guide their children in online environments (Festl & Gniewosz, 2019; Hodge et al., 2012).

Based on the synthesis, the co-use of ICT in families is associated with the following positive outcomes for family relationships: affection between siblings (Coyne, Jensen, et al., 2016), family connection (Kushlev & Dunn, 2019; Padilla-Walker et al., 2012; Williams & Merten, 2011), positive family climate (Festl & Gniewosz, 2019), family functioning (Hodge et al., 2012), closeness and satisfaction (Wang et al., 2018), and more positive interactions (Coyne et al., 2011; Skaug et al., 2018). Co-use also mitigated the negative effects of personal ICT use (Beyens & Beullens, 2017). Notably, three of the positive effects were shown to be causally linked to ICT use (Hodge et al., 2012; Kushlev & Dunn, 2019; Skaug et al., 2018), suggesting that co-use causally increases family relationship quality.

Possible mechanisms by which co-use affects relationships positively – proposed but not tested empirically – are that co-use promotes discussion, documentation, and spending time together. It can also create new family rituals and shared realities, which serve as sources of family cohesion (Coyne, Jensen, et al., 2016; Coyne et al., 2014; Padilla-Walker et al., 2012).

Notably, the form of co-use in which family members teach digital skills to each other or need each other to complete digital tasks (i.e., proxy use) can promote positive relational dependencies and, therefore, act as mechanisms through which ICT affects family relationships positively (Beyens & Beullens, 2017; Correa, 2014; Festl & Gniewosz, 2019; Hänninen et al., 2018; Hodge et al., 2012).

An earlier review of digital games and intergenerational relations highlighted an additional positive effect: it has become easier for members of different generations

to find mutually interesting activities within the growing supply of co-usable ICT (Costa & Veloso, 2016). Our review provides similar evidence: siblings of varying ages and genders and partners who otherwise share little common activities can find mutually interesting digital content and build intimacy by co-using ICT (Coyne, Jensen, et al., 2016; Coyne et al., 2014; Gomillion et al., 2017; Padilla-Walker et al., 2012).

These positive effects notwithstanding, co-use appears to represent a smaller portion of overall ICT use in households. This additional important observation emerged from the systematic review and its many studies examining overall ICT use in families (using measures such as screen time). If more of the screen time were co-use, the effects of screen time should look more like the effects of co-use. Instead, the effects of screen time resemble the effects of technofence, suggesting that technofence is more prevalent than co-use or that the effects of technofence overpower the benefits of co-use. This finding is not surprising considering that the vast majority of content is targeted to individuals, and devices are also mostly personal.

The relative prevalence of co-use and technofence in families has not yet been assessed. Based on the findings of the systematic review, this would be a worthwhile investigation because knowing their relative prevalence could provide a simple indicator of digital well-being in families (Hodge et al., 2012). This issue is further addressed in Chapter 8 in relation to the promotion of digital well-being.

6.2 Article II – Digital and Traditional Communication

In Article II, we investigated whether digital contact (i.e., email, social media, instant messaging, and video calls) is associated with increased or decreased contact via traditional means (i.e., meeting face-to-face, phone calls, and sending letters or postcards). We tested the association in a range of kin dyads (parent-child, grandparent-grandchild, siblings, aunt/uncle-niece/nephew, and with parents-in-law). In addition, we charted the contact frequencies within each family relationship type.

The results show that digital contact is positively associated with all traditional forms of contact in all family relationship types. In other words, the results do not support the displacement hypothesis. Rather, it appears that digital communication methods are used to complement older methods of communication between members of kin among Finnish adults.

In addition to the main results, the study found that mothers, daughters, sisters, and maternal grandmothers communicate more frequently than their male (or

paternal) counterparts. Digital methods are also more prevalent among younger respondents.

The results align with a similar study conducted in Hong Kong by Shen et al. (Shen et al., 2017). They found that communicating face-to-face with family members was positively associated with using all other common methods of contact with them (phone, instant messages, social media, video calls, and email). The studies contribute to each other's generalizability in that converging results were found in two cultures with high penetration of ICT but dissimilar family cultures. Regardless of the cultural differences, digital communication among kin appears to have taken a complementary and reinforcing role in overall communication.

Informed by the media richness theory (Daft & Lengel, 1986), we also tested digital communication without including video calls because video calls may relate to face-to-face contact differently compared to the other digital methods. (The media richness theory posits that video calls resemble face-to-face contact in their "richness"). However, the respondents rarely reported video calls, and the test showed that excluding video calls did not make a difference to the overall results.

Taken together, the results contradict the displacement hypothesis, which hypothesizes that digital communication methods displace traditional communication methods. At first glance, the results appear to clash with the Finnish statistics showing that in-person meeting frequencies between family members in Finland have declined during the diffusion of ICT (Hanifi, 2019). However, it is important to stress that our results do not imply that ICT use causally increases communication in family relationships. Rather, our results show that those who communicate using one method are also more likely to communicate using other methods, and conversely, those who communicate scarcely using one method also use other methods less. Therefore, the overall contact frequency may have decreased at the population level with the rise of digital methods (as indicated in the Finnish statistics) while they remain positively associated at the relationship level (as indicated in our study). In future research, longitudinal designs would be useful for understanding the relationship between digital and traditional forms of contact and whether there is a causal effect.

6.3 Article III – Predictors of Social Media Use

Article III examined social media use in two family generations of Finnish adults (younger family generation 19–56 years; older family generation 68–74 years). The study aimed to chart the generation-specific predictors of social media adoption.

The data showed that social media use is almost twice as prevalent in the younger family generation (80 %) compared to the older family generation (42 %). Second, the results from the analyses align with the earlier literature in that younger age,

being female, and higher education were the most prominent predictors of social media adoption (Bell et al., 2013; Gaia et al., 2021; Hutto et al., 2015; Newman et al., 2019; Richter et al., 2013; Yu, 2020; Yu et al., 2016). Our study replicated these findings, however showing that the influence of gender and education is less pronounced in the older family generation.

Besides demographic predictors, our study additionally provides several types of evidence for the role of the family in social media adoption. First, looking at the distributions of various kin and non-kin with whom respondents were in contact via social media, we found that the older family generation's social media networks were more family-centered than those of their children. This was anticipated based on statistics from the US (Hutto et al., 2015; Vogels, 2019; Zickuhr & Madden, 2012) as well as the theoretical approaches (presented in Chapter 2), namely, the inclusive fitness theory (Hamilton, 1964; Hughes, 1988) and the socioemotional selectivity theory (Carstensen et al., 1999; Löckenhoff & Carstensen, 2004), which both suggest that older adults' communication efforts are more family-centered.

Second, social media adoption was predicted by the number of children the respondent had, suggesting that family, especially younger family members, scaffolds social media adoption among (older) adults. The more children the respondents (excluding the younger men) had, the more likely they were to be social media users. Furthermore, the social media use of an adult child representing the younger family generation predicted the social media adoption of their parent representing the older family generation.

These findings provide quantitative evidence about the role children play in their parents' social media adoption. The results complement earlier findings that have shown that younger family members can be both external and internal motivators of social media adoption. External motivation means that younger family members encourage their parents to go online and provide technical assistance to them (Aarts, 2018; Bell et al., 2013; Hänninen et al., 2021; Jung et al., 2017; Yu, 2020). Internal motivation, on the other hand, means that for parents and grandparents, additional ways of being involved in the lives of their children and grandchildren motivate them to adopt social media (Aarts, 2018; Nef et al., 2013; Newman et al., 2019; Zickuhr & Madden, 2012).

Overall, it appears that both family generations are influenced similarly, but the social network influences become more pronounced in older adults. In other words, among older adults, characteristics of their social lives, most notably contacts with children, are more salient predictors of social media adoption than among younger adults.

Contrary to some earlier findings (Yu et al., 2016), our results do not show that widows and childless individuals are more likely to adopt social media, nor are individuals who are deprived of friends or who have health issues. Therefore, social

media do not appear to be used in a compensatory manner to mitigate the lack of social contacts in the studied population. As an exception, in our results, divorced women in the younger generation and divorced men in the older generation formed pockets of more frequent social media users, suggesting that social media can play a compensatory role in some limited circumstances.

6.4 Article IV – Social Media Contact with Family and Happiness

In Article IV, we tested whether social media contact (SMC) with a family member is associated with happiness in adults of different ages. We expected to find two patterns: first, that older adults have family members as their social media contacts more often than younger adults, and second, that older adults' SMC with family members is a source of happiness for them.

First, as predicted and already shown above (in Article III), the results demonstrated the expected “family shift” in older adults' social networks. In other words, the distributions showed that younger adults use social media more with non-family while older adults use social media more with family members. This is aligned with the earlier literature, which has shown that older adults' social media use is more family-centered than that of younger adults (Hutto et al., 2015; Nef et al., 2013; Newman et al., 2019; Zickuhr & Madden, 2012).

Earlier literature also suggests that older adults more than younger adults may use social media in ways that benefit them emotionally (Brandtzaeg et al., 2010; Carstensen et al., 1999; Chan, 2015, 2018; P. F. Chang et al., 2015; Löckenhoff & Carstensen, 2004; Wrzus et al., 2013). Contrary to our prediction, our results did not show that older adults' SMC with family improved their happiness. In our sample of 68–74-year-old adults, SMC with family members did not increase happiness.

Contrary to the hypothesis, among the younger adults, several positive associations existed between SMC with family and happiness. In the younger generation, women's SMC with their daughters and men's SMC with their mothers were associated with happiness. These associations were not based on selection along the control variables, and the association also held after applying the propensity score matching (PSM) procedure, therefore showing an indication of causality.

For a closer examination of the younger family generation, which constitutes a wide age range, we reran the analyses after further dividing them into two age groups: younger (19–39-year-olds) and middle-aged (40–54-year-olds) adults. The analyses revealed that the effect of mother-daughter SMC on happiness was driven by middle-aged women's SMC with their daughters. Similarly, the effect of men's SMC with their mothers on happiness was driven by middle-aged men's SMC with

their mothers. In addition, younger men were happier if they had SMC with a daughter, although this result was based on a small number of observations (15 men with SMC with a daughter).

The support for the *socioemotional selectivity theory*, which posits that older adults selectively use their time and energy to invest in a small number of emotionally gratifying relationships (Carstensen et al., 1999; Löckenhoff & Carstensen, 2004), is weak. The results do not imply that communication via social media is emotionally rewarding for older adults. In contrast, increases in happiness were observed in middle-aged adults suggesting that social media may cater to some mid-life specific needs, such as the need to stay updated in the affairs of both aging parents and dependent children (David-Barrett et al., 2016; Robinson et al., 2015).

Building on the previously presented result (Article II), it is possible that those who are already well connected with their family and thereby are also more likely to use social media simply do not derive *additional* happiness from SMC compared to the happiness that they already derive from other methods of communication. It is also possible that social media are used passively while a more active communication medium such as instant messaging would have shown a positive effect, as has been found in a study across a number of countries, including Finland (Rosenberg & Taipale, 2022). Importantly, even though we did not find social media use to be associated with happiness, it may foster other aspects of well-being that were not captured in our variable, such as staying socially active (Chen & Schulz, 2016).

7 Implications for Digital Divides

In this chapter, I discuss what the results of the four studies presented in the previous chapter offer with respect to digital divides in the family context. The focus is on how the positive and negative effects of ICT are distributed across family relationship types and family backgrounds, as well as on family members' influence on one another (i.e., that an individual's ICT use and outcomes depend on their family members). Both the main findings as well as their implications for digital divides are additionally summarized in Table 5.

Article I, which charted the positive and negative effects of ICT on family relationships, showed the selective distribution of the positive and negative impacts across different kinds of families and family relationship types. The following three divides emerged:

First, distinct from other family relationships, romantic relationships face additional relationship-specific challenges imposed by ICT; namely, behaviors and emotions related to infidelity and jealousy. These negative effects were established in many of the reviewed studies and have also been recognized in earlier reviews (Imperato & Mancini, 2019; Rus & Tiemensma, 2017). Behaviors and emotions related to infidelity and jealousy as well as relationship dissolution are effects of ICT that apply only to romantic relationships. Since they affect romantic relationships *in addition* to the other negative effects common to all relationships, such as displaced attention and conflict, the range of negative outcomes from ICT use for romantic relationships is larger than in other relationships. In terms of digital divides, this implies that ICT disproportionately negatively affects young adults' family relationships because communication needs in that particular life-stage focus on romantic partners (David-Barrett et al., 2016). In other words, ICT may disturb the formations of committed partnerships and it may even be a contributor in the trend of delayed family formation.

Second, parent-child relationships with younger children appeared to be more prone to experience ICT-related harms (Myruski et al., 2017; Radesky et al., 2015) than those with adolescent or adult children (Padilla-Walker et al., 2012; Stockdale et al., 2018). Therefore, it may be that parent-child relationships in which the children are more highly dependent are more vulnerable to ICT disturbances than

those of less dependent older children. The evidence for this is based on only a few studies, making this interpretation tentative. However, this result is worth highlighting because another review has addressed this issue, finding more support (Knitter & Zemp, 2020). Furthermore, this issue carries particular weight because ICT-imposed disruptions to parent-child relationships and parental ICT use can have far-reaching repercussions in the child's life, spilling into other life domains, such as the child's educational outcomes, digital skills, and digital inclusion (Camerini et al., 2018; Gran et al., 2021; Kaarakainen & Saikkonen, 2022).

Third, many of the reviewed studies provide information about the socioeconomic backgrounds of the respondents, therefore they also provide insight into whether socioeconomic characteristics of the family moderate the effects of ICT. The compiled findings show that the positive effects of ICT for family relationships accumulate with pre-existing advantages. First, remote work via ICT was more common among those with higher socioeconomic standing, enabling more time to be spent with family (Billari et al., 2019). Second, parents with higher resources were more involved in their children's media use, and this was associated with improved relationship quality (Festl & Gniewosz, 2019). The same result was also found in a longitudinal design (Hodge et al., 2012). Third, higher education and income were both associated with more ICT use for communication with family members (Wang et al., 2015). Fourth, ICT was used to access and strengthen existing family relationships rather than to compensate for the lack thereof (Amichai-Hamburger & Hayat, 2011). Last, ICT facilitated access to family support, which, in turn, improved adjustment to parenthood (Bartholomew et al., 2012).

Correspondingly, there is also evidence for negative impacts accumulating among those with lower socioeconomic status: lower socioeconomic status was associated with more disruptive ICT use, which, in turn, was associated with less time spent on childcare (Vilhelmson et al., 2016) and lower levels of family connection (Padilla-Walker et al., 2012).

The above-listed evidence supports the view of ICT as reinforcing existing differences in family resources. In addition, there are two studies that – while not contradicting this view – show no difference. In these studies, family income did not predict co-playing video games in families (Coyne et al., 2011), which means that the benefits of co-playing may be equally accessible. In addition, the choice of the communication method adopted between siblings did not depend on socioeconomic background, hence, the benefits of richer communication methods also did not follow socioeconomic divides, at least in the adult siblings' relationships (Lindell et al., 2015).

The findings highlight the scarcely addressed family perspective in the digital divide discourse. They also add to earlier evidence about ICT enhancing both advantages (Blank & Lutz, 2018; Büchi et al., 2016; Gran et al., 2021; van Deursen

& Helsper, 2015) and disadvantages (Choi & Dinitto, 2013; Courtois & Verdegem, 2016; Gui & Büchi, 2021; Hartshorne et al., 2021; Helsper, 2012; Määttä et al., 2017; Rainie et al., 2013), showing that, also in the family context, pre-existing resources are reinforced. Regarding the argument that ICT could mitigate pre-existing divides in the social domain or that ICT's benefits in the social domain are equally accessible irrespective of socioeconomic background (Blank & Lutz, 2018; Büchi et al., 2016; Rains & Tsetsi, 2017; van Deursen & Helsper, 2015; Waytz & Gray, 2018), the review does not provide support for this in the family context.

Article II investigated whether digital communication enhances or displaces other more traditional forms of contact in a range of family relationships. Although we did not examine the moderating roles of socioeconomic variables in the study – merely controlling for their effects – the results nevertheless contribute to the discussion of digital divides. The results demonstrate a positive relationship between digital and other forms of contact in all family relationship types, and, therefore, the study shows that ICT has taken a complementary role in overall family communication. These results align with earlier studies that have shown ICT use to be associated with increased overall contact (Ahn & Shin, 2013; Amichai-Hamburger & Hayat, 2011; Fortunati et al., 2013; Shen et al., 2017). Surprisingly, even variables such as geographical distance did not change this relationship between digital and other forms of communication, although intuitively, digital methods could be used to compensate for infrequent face-to-face contact between geographically distant family members. In short, the results display a “rich-get-richer” pattern; that is, those who have higher baseline communication further complement communication with digital media.

Article III charted the predictors of social media adoption in younger and older adults and tested whether those with existing social capital, in the form of either an active social life or more numerous strong-tie relationships (including children), were more likely to have adopted social media. The results show that those with more social contacts were more likely to have adopted social media. Moreover, the number of children and the children's social media use were significant predictors of social media adoption among older adults. This implies that those older adults who do not have the advantage of having social support from their children are less likely to adopt social media. The relevant further question arising based on the findings is whether older adults without family support are also less likely to use other types of ICT and, thereby are at risk of digital exclusion.

In addition, the results of Article III show that the widowed and childless were not more likely to be social media adopters, and neither were those who were deprived of friends or had health issues. This contradicts some earlier findings that have suggested that social media may be used to compensate for a lack of social contact (Chen & Schulz, 2016; Hutto et al., 2015; Nguyen et al., 2020; Simons et al.,

2021; Yu et al., 2016). In other words, the results from both Articles II and III do not indicate that ICT would take a compensatory role in communication; rather that the role appears to be a complementary one.

Article IV tested whether social media contact (SMC) with family members increases happiness. It found that SMC increased happiness among younger and middle-aged adults in some relationship dyads, whereas it did not among older adults. The results suggest that social media may cater to some mid-life specific needs. For example, middle-aged individuals may benefit from social media because in mid-life family communication needs may span over three generations (i.e., it is common to have both dependent children and ageing parents) (David-Barrett et al., 2016) and social media provide low-effort means for staying updated in the affairs of multiple family members (Robinson et al., 2015).

Even though our study did not detect an effect on happiness for older adults, abundant evidence from other studies indicates that social media can benefit older adults in various ways: by helping them to stay socially active (Chen & Schulz, 2016), by fostering their social satisfaction (Bell et al., 2013; Hutto et al., 2015), by improving their subjective well-being (Rosenberg & Taipale, 2022) and social inclusion (Richter et al., 2013), and by boosting their social capital both online and offline (Nguyen et al., 2020; Simons et al., 2021). These results from previous studies, together with the results from our articles (mainly Articles II and III, and partially Article IV), can be summarized as displaying a rich-get-richer pattern: having close family members is beneficial for the adoption of ICT, and using ICT can, in turn, foster those relationships.

To summarize the implications of the results for digital divides, first, ICT-related outcomes in family relationships vary depending on the family relationship type and family socioeconomic background (Article I). Second, ICT does not appear to be widely used in a compensatory manner; rather, it is used in complementary ways among those with prior social advantage and who also communicate frequently in other ways (Articles II and III). Finally, the results indicate that family relationships may function as a gateway into social media (and possibly into digital inclusion more generally) for older adults (Article III) and that social media use for family communication contributes positively to happiness among younger and middle-aged adults (Article IV). In short, the results support the view of ICT as a reinforcer of pre-existing (dis)advantages in the family context.

Table 5. Summary of the main findings of the articles (I–IV) and their implications for digital divides.

ARTICLE	Main findings	Implications for digital divides
I	<ul style="list-style-type: none"> • Personal use and technoference are related to mainly negative outcomes. • Communication via ICT is related to mainly positive outcomes, with richer media showing stronger associations. • Co-use affects relationships positively. 	<ul style="list-style-type: none"> • Romantic relationships are affected more negatively than other family relationships. • Parent-child relationships with younger children and more vulnerable to negative effects • Pre-existing socioeconomic (dis)advantages are reinforced with ICT in families. • Negative effects can be transmitted intergenerationally (e.g., adult use affects child outcomes).
II	<ul style="list-style-type: none"> • Digital contact reinforces traditional contact in all family relationship types. 	<ul style="list-style-type: none"> • Support for the rich-get-richer principle, i.e., that ICT complements communication among those who also communicate more using other means.
III	<ul style="list-style-type: none"> • Predictors of social media adoption are different among younger and older adults. • The number of children and the child’s social media use predict social media adoption among older adults. 	<ul style="list-style-type: none"> • Older adults’ social media adoption is more likely if they have children. Therefore, those who do not have (contact with their) children may be at higher risk for digital exclusion.
IV	<ul style="list-style-type: none"> • Social media contact with family members is associated with happiness in some relationships among middle-aged and younger adults. 	<ul style="list-style-type: none"> • Some support (although not among older adults) for increased happiness among those who are in social media contact with family.

8 Conclusions

In this final chapter, I briefly summarize the findings and present my conclusions. I discuss the strengths and limitations of the thesis and propose future directions. I also readdress the theories in light of the results. To finish, I lay out ways in which the results can be used to benefit society.

8.1 From Results to Conclusions

This thesis synthesized existing knowledge and provided new knowledge about the impacts of information and communication technology (ICT) use on family relationships. The results show that ICT can have both a reinforcing and an undermining effect on family relationships, depending on how it is used, family relationship type, and family resources (Article I).

Of the different ICT use types, personal use, especially in the presence of family members (i.e., technofence), mainly undermines the quality of family relationships, with romantic relationships being most clearly negatively affected. On the other hand, ICT also benefits families because it facilitates and complements communication (Article II), it is positively (or neutrally) related to subjective happiness and relationship quality (Articles IV and I, respectively), and it provides mutually interesting activities (Article I). Despite the positive effects found in relation to communication and co-use, the review (Article 1) suggests that the harms of personal use and technofence for families are more salient than the benefits of communication and co-use.

The results also show that digital communication has taken a complementary rather than compensatory role in overall family communication (Articles II–III). This means that those who have close family members and communicate with them using traditional means are also more likely to make use of ICT. Besides complementing communication, the benefits of ICT are more accessible to those with other prior social advantage: for example, an older adult with social support from their child is more likely to use ICT than one who lacks such support (Article III), and families of high socioeconomic status are likelier to use ICT in ways that benefit their family relationships (Article I).

The family's role, so far, has been scarcely addressed in the digital divide literature. This thesis contributes to the literature by highlighting the family's role in shaping digital divides. Aligning with the prior literature (Blank & Lutz, 2018; Büchi et al., 2016; Choi & Dinitto, 2013; Courtois & Verdegem, 2016; Gran et al., 2021; Gui & Büchi, 2021; Hartshorne et al., 2021; Helsper, 2012; Määttä et al., 2017; Rainie et al., 2013; van Deursen & Helsper, 2015), this thesis demonstrates that, *also in family context*, the positive effects of ICT accumulate with prior advantages (i.e., the "rich-get-richer" effect).

Moreover, the studies help in identifying groups that face life-stage specific challenges due to ICT. First, the wide-spread use of social media and dating platforms has led to the paradoxical challenge of choice overload in potential romantic partners (Scheibehenne et al., 2010; Wu & Chiou, 2009). This challenge disproportionately burdens young adults who are in the life-stage in which long-term partnerships are sought and formed (Article I) and this may have repercussions on their future family relationships and family formation.

Another particular risk group is those older individuals with few or no close family members because they are less likely to have the needed support and motivation to adopt ICT (Article III). Therefore, they are at risk for digital exclusion which, in turn, may also leave them with weakened access to various forms of services and support in society.

A third notable finding with high relevance for digital divides pertains to adults' and parents' ICT use and how it affects children. Contrasting most public concerns, which have centered on children's and adolescents' excessive ICT use (Anderson et al., 2018; Turkle, 2011; Twenge, 2017), this thesis indicates that adults' and parents' ICT use can have adverse consequences on children. Importantly, parents' ICT use affects both the quality of the parent-child relationships (Article I) and the ICT practices that the child adopts (Hefner et al., 2019). These can have long-lasting effects on the lives of children, including their academic achievements, their future digital practices, and their digital inclusion (Camerini et al., 2018; Kaarakainen & Saikkonen, 2022).

To summarize the conclusions: first, ICT use can have both adverse and beneficial effects on family relationships, however, the adverse effects appear to be more salient due to ICT being predominantly used for personal purposes (as opposed to communication or co-use with family members). Second, the benefits of ICT for relationships accumulate with preexisting advantages in families, therefore, family relationships reinforce digital divides. Finally, the studies have identified the unique ways in which family contexts are intertwined with digital inequality in various life-stages: in the partnership-formation phase of young adults and in the transmission of effects between parents and their (adult) children in various life-stages.

8.2 Strengths and Limitation

The credibility of the present results needs to be weighed against the strengths and limitations of the materials and methods used.

Notable strengths of this thesis are: first, that the time frame of the systematic review neatly represents “the decade of smartphones and social media,” improving the validity of the findings and their generalizability to present ICT. Second, the systematic approach adds credibility to the interpretations concerning the positive and negative outcomes of ICT use and their relative prevalence, while also exposing biases in topic choices made by researchers. Third, the systematic approach credibly identifies little-explored or unexplored territories, such as underrepresented relationship types (e.g., siblings and relationships of older adults). Finally, the systematic review provides a robust foundation for the other three articles (II–IV) as it systematically compiles the earlier literature as well as the evidence around the displacement hypotheses and the media richness theory, which had not been done before.

The strengths of the Gentrans survey data are that they are representative and constitute a large age range. This is a significant advantage because older adults’ ICT use is often either neglected or studied in isolation. Furthermore, the data allowed for controlling for an extensive range of covariates. All of these strengths improve the generalizability and comparability of the findings (keeping in mind that Finland represents a Western and individualistic family culture with high ICT penetration).

As for the limitations, most of the data, in both the reviewed studies (Article I) and the survey studies (Articles II–IV), rely on self-reported behavior. Self-reports risk underestimating ICT use and also encounter problems relating to the increasing trend of using multiple devices or applications simultaneously (Kaye et al., 2020). Future research should strive to use objective or otherwise more sophisticated measures of ICT use rather than, or alongside, self-reports.

Moreover, the slow process of gathering and reporting survey data compared to the fast pace of technological change means that the findings may be outdated before they are published. These problems (self-reports and time lag) are increasingly circumvented with the help of computational social science and access to industry data about users’ actual real-time online social behavior. However, while computational social science and industry data are revolutionizing the field, the dialog between the ICT industry and social sciences remains limited and plagued with ethical questions (Lazer et al., 2020). Moreover, some social phenomena, such as subjective relationship quality and questions related to offline behavior (e.g., sending letters or meeting face-to-face) that do not leave digital traces continue to be best studied using traditional social science research methods.

Another limitation is the primarily cross-sectional nature of the findings. With most of the data and methods used here, reverse causality cannot be eliminated. In

other words, what are considered the effects of ICT use may, in fact, be antecedents of ICT use. The systematic review (Article I) included some studies that used longitudinal or experimental methods, which give more support for causal interpretations about the effects of ICT use on relationship quality. These few studies supported the assumed causal direction; that is, that the ICT variable affected the relationship variable (although this does not, of course, eliminate the possibility of bidirectional effects). Notably, all of the studies on communication via ICT were cross-sectional, and any causal interpretations are premature. Therefore, it remains unknown to what degree the choice of medium affects relationships and to what degree relationship characteristics shape media choices. In order to strengthen causal inference, we employed the propensity score matching (PSM) method in Article IV. Although adding credibility to the causal interpretation, even the PSM method cannot fully eliminate the possibility of reverse causality. These caveats emphasize the need for more research with methods that allow causal inference. This is especially important from the point of view of societal interventions since questions of causal directions directly affect the efficacy of any actions aimed at tackling ICT-related inequalities and other negative effects.

8.3 Theoretical Development

Since ICT use in everyday life is a relatively new research area and one which is constantly transforming, the theoretical foundations are also young and fragmented. In the literature, theoretical frameworks are drawn from various research traditions and have limited application. For example, theoretical frameworks that would incorporate both the dynamics of personal relationships and the media are lacking. Such theoretical development is paramount in order to devise more sophisticated measuring instruments.

This thesis offers some theoretical insights that have implications for future research designs. First, the results emphasize that the *context* of screen time should be recognized as impactful for relationships. Earlier, measuring screen time has been criticized for obscuring a range of diverse behaviors, and some have called for more content-specific measures (Davies et al., 2019). However, a content-focus does not go much further: as shown in this thesis, various *content* is used across relationship *contexts*. That is, video games can be played together or alone, and social media can be a tool for communication in the family but also a source of technofence. Therefore, this thesis supports the following theoretical argument made by Hodge et al. (2012): when studying family relationships, an important aspect of ICT use is the relationship context; that is, whether ICT is used together, such as for communication or co-use, or whether it is used alone, such as in personal use and technofence.

Second, the systematic review shows that the understanding of the *mechanisms* through which ICT affects relationships, with few exceptions, is underdeveloped. Only romantic relationships have been extensively researched, and ICT-facilitated infidelity (actual or imagined) and jealousy as the mechanism between ICT use and lower relationship quality has been well-established (Imperato & Mancini, 2019; Rus & Tiemensma, 2017). Concerning all relationship types, the mechanisms of displacement (of time, attention, or other communication methods) are the most commonly proposed mechanisms by which ICT affects family relationships. However, as the systematic review shows (Article I), the evidence is still inconclusive. The time-displacement hypothesis received little support, and the attention-displacement hypothesis received some support, whereas the displacement of other methods of communication was rebutted (also shown in Article II). Based on the evidence so far, the attention-displacement hypothesis is the strongest hypothesis explaining the negative effects of ICT use on relationships and one which has also been established in non-family relationships (Nuñez & Radtke, 2023; Sbarra et al., 2019).

Third, the socioemotional selectivity theory, which predicted an emotional reward from family communication among older adults, did not receive support in the context of social media. It is possible that an increase in happiness would have been observed had we chosen to test the theory using all methods of digital communication rather than focusing only on social media. As we learned from Article II, communication methods are correlated with one another, hence, it is possible that social media simply does not bring additional emotional rewards beyond those accruable via other communication methods.

Fourth, the media richness theory, which also posits a mechanism through which ICT may affect relationships (i.e., that “richer” methods of communication support intimacy better than “less rich” methods), received support but only from cross-sectional research, making the support tentative. The cross-sectional design cannot eliminate the alternative, and intuitively very possible, scenario that closer and better-functioning family relationships choose “richer” methods of communication.

In addition to the theoretical approaches discussed thus far, some noteworthy hypotheses about the mechanisms by which ICT affects relationships have been put forward but remain untested. For example, the *bystander inaccessibility hypothesis* posits that when ICT is used for personal purposes in the presence of others (i.e., bystanders), there is an asymmetry between the bystanders and the ICT user in the information available about what is being done on the device. In this hypothesis, it is this asymmetry that causes friction, creating a mechanism through which ICT impacts relationships negatively (Mantere, 2020).

As for the evolutionary approach, it was used to justify the separation of relationship types in the analyses of all the studies. In the systematic review (Article

I), the separation yielded marked differences highlighting the unique mechanisms affecting romantic relationships. In the articles that used the survey data (Articles II–IV), patterns that were expected based on the evolutionary approach were also found. These were: an increased preference among older adults for family communication and a preference toward genetically closer and younger relatives.

Finally, I used the digital divide framework as a lens of interpretation for the results. The results can be interpreted as displaying third-level digital divides, in other words, the extent to which ICT benefits individuals is contingent on pre-existing resources; in this case, family resources. More specifically, the ways in which ICT affects family relationships are dependent on pre-existing conditions in those relationships. Similarly to the previous literature, which has established that ICT enables greater relative gains among users with prior advantages socially and economically (Gui & Büchi, 2021; Helsper, 2012; van Deursen & Helsper, 2015), the present results show that when focusing on the resources embedded in the family context, ICT also increases inequalities rather than mitigates them.

8.4 Promoting Digital Well-Being in Society

I will finish this thesis by envisaging how the findings can inform policy. The first step is recognition of the issue at hand. More specifically, as ICT has penetrated almost every corner of citizens' everyday lives, *digital well-being* should be recognized as an inseparable component of overall well-being. Digital well-being means the use of ICT in ways that promote physical, psychological, and social well-being. It includes the ability to recognize and avoid ICT-related harms as well as the ability to use ICT to promote a healthy, ethical, and meaningful lifestyle (Burr et al., 2020).

Considering that ICT is linked to well-being in so many ways, various indicators of citizens' digital well-being should be developed, and promoters of digital well-being should be invested in, as is done with other areas of well-being. Relating to this, I have argued that the relative prevalence of positive ICT use types (communication and co-use) compared to the negative use types (personal use and technofence) may be a more telling indicator of digital well-being in families than, for example, screen time alone (Hodge et al., 2012). Charting the prevalence of these use types in families could be a starting point for identifying at-risk families.

A significant dimension of digital well-being is digital inclusion and exclusion. This thesis has discussed how family support affects digital inclusion particularly among older adults. Digital inclusion links to other areas of well-being, such as formal and informal social support, as these are increasingly accessed via ICT. Therefore, older adults' digital inclusion is a growing challenge for societies that are both digitalizing and aging.

Increasing public awareness about the ICT use types that promote and undermine well-being can empower individuals to make better choices. Campaigning for higher awareness should be a priority among professionals and educators: for example, information about how technoference and co-use of ICT in families effects relational well-being can be applied in daily family life. In addition, awareness about social media use in romantic relationships may help young adults align their ICT use practices with their long-term relationship goals – perhaps even avoiding unnecessary delays in family formation.

Although general awareness can promote digital well-being, individuals should not face these challenges alone: some legislative actions may also be required to address the negative impacts of ICT. A potential legislative instrument to promote digital well-being would be the regulation of unethical ICT design, as has been advocated by Anderson et al. (2018). While Anderson et al.'s objective has been to protect children, actions may also be needed to curb unethical design targeted at adults – not least because adults' use has downstream consequences for children.

To promote digital well-being and inclusion in society, continuing research about factors influencing ICT adoption and the effects of different ICT use types on well-being is essential. Within this goal, this thesis has contributed to the understanding of how family circumstances are interwoven with digital well-being.

List of References

- Aarts, S. (2018). Social media and loneliness among community-dwelling older adults. *International Journal of Geriatric Psychiatry*, 33(3), 554–555. <https://doi.org/10.1002/gps.4769>
- Abel, S., Machin, T., & Brownlow, C. (2021). Social media, rituals, and long-distance family relationship maintenance: A mixed-methods systematic review. *New Media & Society*, 23(3), 632–654. <https://doi.org/10.1177/1461444820958717>
- Ahlstrom, M., Lundberg, N. R., Zabriskie, R., Eggett, D., & Lindsay, G. B. (2012). Me, my spouse, and my avatar. *Journal of Leisure Research*, 44(1), 1–22. <https://doi.org/10.1080/00222216.2012.11950252>
- Ahn, D., & Shin, D.-H. (2013). Is the social use of media for seeking connectedness or for avoiding social isolation? Mechanisms underlying media use and subjective well-being. *Computers in Human Behavior*, 29(6), 2453–2462. <https://doi.org/10.1016/j.chb.2012.12.022>
- Amichai-Hamburger, Y., & Etgar, S. (2016). Intimacy and smartphone multitasking – A new oxymoron? *Psychological Reports*, 119(3), 826–838. <https://doi.org/10.1177/0033294116662658>
- Amichai-Hamburger, Y., & Hayat, Z. (2011). The impact of the Internet on the social lives of users: A representative sample from 13 countries. *Computers in Human Behavior*, 27(1), 585–589. <https://doi.org/10.1016/j.chb.2010.10.009>
- Anderson, C. A., Azron, C., Beach, W. A., Boninger, F., Sumerson, J. B., Brunelle, E., Buckley, W., Bushman, B. J., Cash, H., Cozen, J., Deak, J., Domoff, S. E., Fagen, D., Flores, L., Fortney- Parks, A., Fowers, B. J., Freed, R., Fundora, V., Gentile, D. A., & Hurst-Della Pietra, P. (2018). *Our letter to APA*. <https://screentimemetwork.org/apa?eType=EmailBlastContent&eId=5026ccf8-74e2-4f10-bc0e-d83dc030c894>
- Arpino, B., Bordone, V., & Balbo, N. (2018). Grandparenting, education and subjective well-being of older Europeans. *European Journal of Ageing*, 15(3), 251–263. <https://doi.org/10.1007/s10433-018-0467-2>
- Balbo, N., & Mills, M. (2011). The influence of the family network on the realisation of fertility intentions. *Vienna yearbook of population research / Vienna Institute of Demography, Austrian Academy of Sciences*, 9, 179–206. <https://doi.org/10.1553/populationyearbook2011s179>
- Baldassar, L., Nedelcu, M., Merla, L., & Wilding, R. (2016). ICT-based co-presence in transnational families and communities: challenging the premise of face-to-face proximity in sustaining relationships. *Global Networks*, 16(2), 133–144. <https://doi.org/10.1111/glob.12108>
- Bartholomew, M. K., Schoppe-Sullivan, S. J., Glassman, M., Kamp Dush, C. M., & Sullivan, J. M. (2012). New parents' Facebook use at the transition to parenthood. *Family Relations*, 61(3), 455–469. <https://doi.org/10.1111/j.1741-3729.2012.00708.x>
- Bell, C., Fausset, C., Farmer, S., Nguyen, J., Harley, L., & Bradley Fain, W. (2013). *Examining social media use among older adults*. HT '13: Proceedings of the 24th ACM Conference on Hypertext and Social Media. <https://doi.org/10.1145/2481492.2481509>
- Bevan, J. L. (2017). Romantic jealousy in face-to-face and technologically-mediated interactions: A communicative interdependence perspective. *Western Journal of Speech Communication: WJSC*, 81(4), 466–482. <https://doi.org/10.1080/10570314.2017.1283048>
- Bevens, I., & Beullens, K. (2017). Parent–child conflict about children's tablet use: The role of parental mediation. *New Media & Society*, 19(12), 2075–2093. <https://doi.org/10.1177/1461444816655099>

- Billari, F. C., Giuntella, O., & Stella, L. (2019). Does broadband Internet affect fertility? *Population Studies*, 297–316. <https://doi.org/10.1080/00324728.2019.1584327>
- Blank, G., & Lutz, C. (2018). Benefits and harms from Internet use: A differentiated analysis of Great Britain. *New Media & Society*, 20(2), 618–640. <https://doi.org/10.1177/1461444816667135>
- Blum-Ross, A., & Livingstone, S. (2018). *The Trouble with “Screen Time” Rules*. https://www.nordicom.gu.se/sites/default/files/kapitel-pdf/16_blum-ross_livingstone.pdf
- Boyle, A. M., & O’Sullivan, L. F. (2016). Staying connected: Computer-mediated and face-to-face communication in college students’ dating relationships. *Cyberpsychology, Behavior and Social Networking*, 19(5), 299–307. <https://doi.org/10.1089/cyber.2015.0293>
- Brandtzaeg, P. B., Heim, J., & Kaare, B. H. (2010). Bridging and bonding in social network sites – investigating family-based capital. *International Journal of Web Based Communities*, 6(3), 231. <https://doi.org/10.1504/IJWBC.2010.033750>
- Buchanan, A., & Rotkirch, A. (Eds.). (2021). *Brothers and Sisters: Sibling Relationships Across the Life Course*. Palgrave Macmillan, Cham. <https://doi.org/10.1007/978-3-030-55985-4>
- Büchi, M., Just, N., & Latzer, M. (2016). Modeling the second-level digital divide: A five-country study of social differences in Internet use. *New Media & Society*, 18(11), 2703–2722. <https://doi.org/10.1177/1461444815604154>
- Burr, C., Taddeo, M., & Floridi, L. (2020). The Ethics of Digital Well-Being: A Thematic Review. *Science and Engineering Ethics*, 26(4), 2313–2343. <https://doi.org/10.1007/s11948-020-00175-8>
- Buss, D. M. (2018). Sexual and emotional infidelity: Evolved gender differences in jealousy prove robust and replicable. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 13(2), 155–160. <https://doi.org/10.1177/1745691617698225>
- Cacioppo, J. T., & Cacioppo, S. (2014). Social relationships and health: The toxic effects of perceived social isolation. *Social and Personality Psychology Compass*, 8(2), 58–72. <https://doi.org/10.1111/spc3.12087>
- Camerini, A.-L., Schulz, P. J., & Jeannet, A.-M. (2018). The social inequalities of Internet access, its use, and the impact on children’s academic performance: Evidence from a longitudinal study in Switzerland. *New Media & Society*, 20(7), 2489–2508. <https://doi.org/10.1177/1461444817725918>
- Capri, T., Gugliandolo, M. C., Iannizzotto, G., Nucita, A., & Fabio, R. A. (2019). The influence of media usage on family functioning. *Current Psychology*. <https://doi.org/10.1007/s12144-019-00204-1>
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, 54(3), 165–181. <https://doi.org/10.1037/0003-066x.54.3.165>
- Carvalho, J., Francisco, R., & Relvas, A. P. (2015). Family functioning and information and communication technologies: How do they relate? A literature review. *Computers in Human Behavior*, 45, 99–108. <https://doi.org/10.1016/j.chb.2014.11.037>
- Carvalho, J., Francisco, R., & Relvas, A. P. (2017). ICTs and family functioning: A study on Portuguese families with adolescents and emerging adults. *Contemporary Family Therapy*, 39(4), 281–288. <https://doi.org/10.1007/s10591-017-9436-8>
- Carvalho, J., Francisco, R., & Relvas, A. P. (2018). Correction to: ICTs and family functioning: A study on Portuguese families with adolescents and emerging adults. *Contemporary Family Therapy*, 40(1), 118–118. <https://doi.org/10.1007/s10591-017-9450-x>
- Chambers, D., & Gracia, P. (2021). *A Sociology of Family Life: Change and Diversity in Intimate Relations*. John Wiley & Sons. <https://books.google.fi/books?id=oo1SEAAQBAJ&lpq=PT5&ots=n1JOrXhlio&dq=family%20definition%20sociology&lr&pg=PP1#v=onepage&q=family%20definition%20sociology&f=false>
- Chan, M. (2015). Multimodal connectedness and quality of life: Examining the influences of technology adoption and interpersonal communication on well-being across the life span. *Journal of Computer-Mediated Communication: JCMC*, 20(1), 3–18. <https://doi.org/10.1111/jcc4.12089>
- Chan, M. (2018). Digital communications and psychological well-being across the life span: Examining the intervening roles of social capital and civic engagement. *Telematics and Informatics*, 35(6), 1744–1754. <https://doi.org/10.1016/j.tele.2018.05.003>

- Chang, F.-C., Chiu, C.-H., Chen, P.-H., Miao, N.-F., Lee, C.-M., Chiang, J.-T., & Pan, Y.-C. (2015). Relationship between parental and adolescent eHealth literacy and online health information seeking in Taiwan. *Cyberpsychology, Behavior and Social Networking*, *18*(10), 618–624. <https://doi.org/10.1089/cyber.2015.0110>
- Chang, F.-C., Miao, N.-F., Chiu, C.-H., Chen, P.-H., Lee, C.-M., Chiang, J.-T., & Chuang, H.-Y. (2016). Urban–rural differences in parental Internet mediation and adolescents’ Internet risks in Taiwan. *Health, Risk & Society*, *18*(3–4), 188–204. <https://doi.org/10.1080/13698575.2016.1190002>
- Chang, P. F., Choi, Y. H., Bazarova, N. N., & Löckenhoff, C. E. (2015). Age differences in online social networking: Extending socioemotional selectivity theory to social network sites. *Journal of Broadcasting & Electronic Media*, *59*(2), 221–239. <https://doi.org/10.1080/08838151.2015.1029126>
- Chen, W. (2013). The implications of social capital for the digital divides in America. *The Information Society*, *29*(1), 13–25. <https://doi.org/10.1080/01972243.2012.739265>
- Chen, Y.-R. R., & Schulz, P. J. (2016). The effect of information communication technology interventions on reducing social isolation in the elderly: A systematic review. *Journal of Medical Internet Research*, *18*(1), e18. <https://doi.org/10.2196/jmir.4596>
- Choi, N. G., & Dinitto, D. M. (2013). The digital divide among low-income homebound older adults: Internet use patterns, eHealth literacy, and attitudes toward computer/Internet use. *Journal of Medical Internet Research*, *15*(5), e93. <https://doi.org/10.2196/jmir.2645>
- Clayton, R. B. (2014). The third wheel: The impact of Twitter use on relationship infidelity and divorce. *Cyberpsychology, Behavior, and Social Networking*, *17*(7), 425–430. <https://doi.org/10.1089/cyber.2013.0570>
- Clayton, R. B., Nagurney, A., & Smith, J. R. (2013). Cheating, breakup, and divorce: is Facebook use to blame? *Cyberpsychology, Behavior and Social Networking*, *16*(10), 717–720. <https://doi.org/10.1089/cyber.2012.0424>
- Cornejo, R., Tentori, M., & Favela, J. (2013). Enriching in-person encounters through social media: A study on family connectedness for the elderly. *International Journal of Human-Computer Studies*, *71*(9), 889–899. <https://doi.org/10.1016/j.ijhcs.2013.04.001>
- Correa, T. (2014). Bottom-up technology transmission within families: Exploring how youths influence their parents’ digital media use with dyadic data. *The Journal of Communication*, *64*(1), 103–124. <https://doi.org/10.1111/jcom.12067>
- Correa, T. (2015). The power of youth: How the bottom-up technology transmission from children to parents is related to digital (in)equality. *International Journal of Communication*, *9*, 1163–1186.
- Costa, L., & Veloso, A. (2016). Being (grand) players: Review of digital games and their potential to enhance intergenerational interactions. *Journal of Intergenerational Relationships*, *14*(1), 43–59. <https://doi.org/10.1080/15350770.2016.1138273>
- Courtois, C., & Verdegem, P. (2016). With a little help from my friends: An analysis of the role of social support in digital inequalities. *New Media & Society*, *18*(8), 1508–1527. <https://doi.org/10.1177/1461444814562162>
- Coyne, S. M., Busby, D., Bushman, B. J., Gentile, D. A., Ridge, R., & Stockdale, L. (2012). Gaming in the game of love: Effects of video games on conflict in couples. *Family Relations*, *61*(3), 388–396. <https://doi.org/10.1111/j.1741-3729.2012.00712.x>
- Coyne, S. M., Jensen, A. C., Smith, N. J., & Erickson, D. H. (2016). Super Mario brothers and sisters: Associations between coplaying video games and sibling conflict and affection. *Journal of Adolescence*, *47*, 48–59. <https://doi.org/10.1016/j.adolescence.2015.12.001>
- Coyne, S. M., McDaniel, B. T., & Stockdale, L. A. (2016). “Do you dare to compare?” Associations between maternal social comparisons on social networking sites and parenting, mental health, and romantic relationship outcomes. *Computers in Human Behavior*, *70*, 335–340. <https://doi.org/10.1016/j.chb.2016.12.081>
- Coyne, S. M., Padilla-Walker, L. M., Fraser, A. M., Fellows, K., & Day, R. D. (2014). “Media time = Family time”: Positive media use in families with adolescents. *Journal of Adolescent Research*, *29*(5), 663–688. <https://doi.org/10.1177/0743558414538316>

- Coyne, S. M., Padilla-Walker, L. M., Stockdale, L., & Day, R. D. (2011). Game on... girls: associations between co-playing video games and adolescent behavioral and family outcomes. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*, 49(2), 160–165. <https://doi.org/10.1016/j.jadohealth.2010.11.249>
- Coyne, S. M., Radesky, J., Collier, K. M., Gentile, D. A., Linder, J. R., Nathanson, A. I., Rasmussen, E. E., Reich, S. M., & Rogers, J. (2017). Parenting and digital media. *Pediatrics*, 140(Suppl 2), S112–S116. <https://doi.org/10.1542/peds.2016-1758N>
- Cui, D. (2016). Beyond “connected presence”: Multimedia mobile instant messaging in close relationship management. *Mobile Media & Communication*, 4(1), 19–36. <https://doi.org/10.1177/2050157915583925>
- Daft, R. L., & Lengel, R. (1986). Organizational information requirements, media richness and structural design. *Management Science*, 32(5), 554–571. <https://doi.org/10.1287/mnsc.32.5.554>
- Danielsbacka, M. (2016). *Grandparental investment and family dynamics in contemporary Europe* [Ph.D.]. University of Helsinki.
- Danielsbacka, M., Hämäläinen, H., & Tanskanen, A. O. (Eds.). (2020). *Suomalainen auttaminen: Tukiverkostot suurten ikäluokkien ja heidän lastensa elämässä*. Gaudeamus.
- Danielsbacka, M., & Tanskanen, A. O. (2016). The association between grandparental investment and grandparents’ happiness in Finland. *Personal Relationships*, 23, 787–800. <https://doi.org/10.1111/pere.12160>
- Daspe, M.-È., Vaillancourt-Morel, M.-P., Lussier, Y., & Sabourin, S. (2018). Facebook use, Facebook jealousy, and intimate partner violence perpetration. *Cyberpsychology, Behavior and Social Networking*, 21(9), 549–555. <https://doi.org/10.1089/cyber.2018.0159>
- David-Barrett, T., Kertesz, J., Rotkirch, A., Ghosh, A., Bhattacharya, K., Monsivais, D., & Kaski, K. (2016). Communication with Family and Friends across the Life Course. *PloS One*, 11(11), e0165687. <https://doi.org/10.1371/journal.pone.0165687>
- Davies, S. C., Atherton, F., Calderwood, C., & McBride, M. (2019). *United Kingdom Chief Medical Officers’ commentary on ‘Screen-based activities and children and young people’s mental health and psychosocial wellbeing: a systematic map of reviews’*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/777026/UK_CMO_commentary_on_screentime_and_social_media_map_of_reviews.pdf
- Deindl, C., Brandt, M., & Hank, K. (2016). Social networks, social cohesion, and later-life health. *Social Science & Medicine*, 126(6), 1175–1187. <https://doi.org/10.1007/s11205-015-0926-5>
- Dew, J., & Tulane, S. (2015). The association between time spent using entertainment media and marital quality in a contemporary dyadic national sample. *Journal of Family and Economic Issues*, 36(4), 621–632. <https://doi.org/10.1007/s10834-014-9427-y>
- Dickson, K., Richardson, M., Kwan, I., MacDowall, W., Burchett, H., Stansfield, C., Brunton, G., Sutcliffe, K., & Thomas, J. (2018). *Screen-Based Activities and Children and Young People’s Mental Health: A Systematic Map of Reviews*. EPPI-Centre, Social Science Research Unit, UCL Institute of Education, University College London.
- Dienlin, T., Masur, P. K., & Trepte, S. (2017). Reinforcement or displacement? The reciprocity of FtF, IM, and SNS communication and their effects on loneliness and life satisfaction. *Journal of Computer-Mediated Communication*, 22(2), 71–87. <https://doi.org/10.1111/jcc4.12183>
- DiMaggio, P., Hargittai, E., Celeste, C., & Shafer, S. (2004). Digital inequality: From unequal access to differentiated use. In K. Neckerman (Ed.), *Social Inequality* (pp. 355–400). Russell Sage Foundation New York.
- Dimmick, J., Klein, S., & Stafford, L. (2000). The gratification niches of personal e-mail and the telephone: Competition, displacement and complementarity. *Communication Research*, 27(2), 227–248. <https://doi.org/10.1177/009365000027002005>
- Dimmick, J., & Rothenbuhler, E. (1984). The theory of the niche: Quantifying competition among media industries. *The Journal of Communication*, 34(1), 103–119. <https://doi.org/10.1111/j.1460-2466.1984.tb02988.x>

- Dunbar, R. (2021). *Friends: Understanding the Power of our Most Important Relationships*. Little, Brown.
- Dworkin, J., Rudi, J. H., & Hessel, H. (2018). The state of family research and social media. *Journal of Family Theory & Review*, *10*(4), 796–813. <https://doi.org/10.1111/jftr.12295>
- Eichenberg, C., Huss, J., & Küsel, C. (2017). From online dating to online divorce: An overview of couple and family relationships shaped through digital media. *Contemporary Family Therapy*, *39*(4), 249–260. <https://doi.org/10.1007/s10591-017-9434-x>
- Elphinston, R. A., & Noller, P. (2011). Time to face it! Facebook intrusion and the implications for romantic jealousy and relationship satisfaction. *Cyberpsychology, Behavior and Social Networking*, *14*(11), 631–635. <https://doi.org/10.1089/cyber.2010.0318>
- Erickson, L. B. (2011). Social media, social capital, and seniors: The impact of Facebook on bonding and bridging social capital of individuals over 65. *Proceedings of the Seventeenth Americas Conference on Information Systems*. http://aisel.aisnet.org/amcis2011_submissions
- Eyal, N. (2013). *Hooked: How to Build Habit-Forming Products*. Penguin Random House.
- Eynon, R., & Helsper, E. (2015). Family dynamics and Internet use in Britain: What role do children play in adults' engagement with the Internet? *Information, Communication and Society*, *18*(2), 156–171. <https://doi.org/10.1080/1369118X.2014.942344>
- Faverio, M. (2022). *Share of those 65 and older who are tech users has grown in the past decade*. Pew Research Center. <https://www.pewresearch.org/fact-tank/2022/01/13/share-of-those-65-and-older-who-are-tech-users-has-grown-in-the-past-decade/>
- Festl, R., & Gniewosz, G. (2019). Role of mothers' and fathers' Internet parenting for family climate. *Journal of Social and Personal Relationships*, *36*(6), 1764–1784. <https://doi.org/10.1177/0265407518771753>
- Fortunati, L., Taipale, S., & de Luca, F. (2013). What happened to body-to-body sociability? *Social Science Research*, *42*(3), 893–905. <https://doi.org/10.1016/j.ssresearch.2012.12.006>
- Friemel, T. N. (2016). The digital divide has grown old: Determinants of a digital divide among seniors. *New Media & Society*, *18*(2), 313–331. <https://doi.org/10.1177/1461444814538648>
- Gaia, A., Sala, E., & Cerati, G. (2021). Social networking sites use and life satisfaction. A quantitative study on older people living in Europe. *European Societies*, *23*(1), 98–118. <https://doi.org/10.1080/14616696.2020.1762910>
- Gentzler, A. L., Oberhauser, A. M., Westerman, D., & Nadorff, D. K. (2011). College students' use of electronic communication with parents: Links to loneliness, attachment, and relationship quality. *Cyberpsychology, Behavior and Social Networking*, *14*(1–2), 71–74. <https://doi.org/10.1089/cyber.2009.0409>
- Gomillion, S., Gabriel, S., Kawakami, K., & Young, A. F. (2017). Let's stay home and watch TV: The benefits of shared media use for close relationships. *Journal of Social and Personal Relationships*, *34*(6), 855–874. <https://doi.org/10.1177/0265407516660388>
- Goodman-Deane, J., Mieczakowski, A., Johnson, D., Goldhaber, T., & Clarkson, P. J. (2016). The impact of communication technologies on life and relationship satisfaction. *Computers in Human Behavior*, *57*, 219–229. <https://doi.org/10.1016/j.chb.2015.11.053>
- Gran, A.-B., Booth, P., & Bucher, T. (2021). To be or not to be algorithm aware: a question of a new digital divide? *Information, Communication and Society*, *24*(12), 1779–1796. <https://doi.org/10.1080/1369118X.2020.1736124>
- Gui, M., & Büchi, M. (2021). From use to overuse: Digital inequality in the age of communication abundance. *Social Science Computer Review*, *39*(1), 3–19. <https://doi.org/10.1177/0894439319851163>
- Hall, J. A., Johnson, R. M., & Ross, E. M. (2019). Where does the time go? An experimental test of what social media displaces and displaced activities' associations with affective well-being and quality of day. *New Media & Society*, *21*(3), 674–692. <https://doi.org/10.1177/1461444818804775>
- Hall, J. A., Kearney, M. W., & Xing, C. (2018). Two tests of social displacement through social media use. *Information, Communication & Society*, *22*(10), 1396–1413. <https://doi.org/10.1080/1369118X.2018.1430162>

- Halpern, D., & Katz, J. E. (2017). Texting's consequences for romantic relationships: A cross-lagged analysis highlights its risks. *Computers in Human Behavior*, *71*, 386–394. <https://doi.org/10.1016/j.chb.2017.01.051>
- Hämäläinen, H., Danielsbacka, M., Hägglund, A. E., Rotkirch, A., & Tanskanen, A. O. (2021). *Sukupolvien suhteet - Ikääntyminen ja vuorovaikutuksen muutos suurten ikäluokkien ja aikuisten lasten elämäkuluissa*. Väestöliitto.
- Hamilton, W. (1964). The genetical evolution of social behaviour, I and II. *Journal of Theoretical Biology*, *7*, 1–52.
- Hampton, K. N., & Ling, R. (2013). Explaining communication displacement and large-scale social change in core networks. *Information, Communication and Society*, *16*(4), 561–589. <https://doi.org/10.1080/1369118X.2013.777760>
- Hand, M. M., Thomas, D., Buboltz, W. C., Deemer, E. D., & Buyanjargal, M. (2013). Facebook and romantic relationships: intimacy and couple satisfaction associated with online social network use. *Cyberpsychology, Behavior and Social Networking*, *16*(1), 8–13. <https://doi.org/10.1089/cyber.2012.0038>
- Hanifi, R. (2019). *Vapaa-aikatutkimus*. Statistics Finland. <https://www.slideshare.net/Tilastokeskus/vapaa-aika-ennen-ja-nyt-sosiaaliset-suhteet-digiajassa-riitta-hanifi-tilastokeskus>
- Hänninen, R., Taipale, S., & Korhonen, A. (2018). Refamilisation in the broadband society – the effects of ICTs on family solidarity in Finland. *Journal of Family Studies*, *27*(2), 161–177. <https://doi.org/10.1080/13229400.2018.1515101>
- Hänninen, R., Taipale, S., & Luostari, R. (2021). Exploring heterogeneous ICT use among older adults: The warm experts' perspective. *New Media & Society*, *23*(6), 1584–1601. <https://doi.org/10.1177/1461444820917353>
- Hargittai, E. (2010). Digital na(t)ives? Variation in Internet skills and uses among members of the “Net Generation”. *Sociological Inquiry*, *80*(1), 92–113. <https://doi.org/10.1111/j.1475-682X.2009.00317.x>
- Hartshorne, J. K., Huang, Y. T., Lucio Paredes, P. M., Oppenheimer, K., Robbins, P. T., & Velasco, M. D. (2021). Screen time as an index of family distress. *Current Research in Behavioral Sciences*, *2*, 100023. <https://doi.org/10.1016/j.crbeha.2021.100023>
- Hefner, D., Knop, K., Schmitt, S., & Vorderer, P. (2019). Rules? Role model? Relationship? The impact of parents on their children's problematic mobile phone involvement. *Media Psychology*, *22*(1), 82–108. <https://doi.org/10.1080/15213269.2018.1433544>
- Helsper, E. J. (2012). A corresponding fields model for the links between social and digital exclusion. *Communication Theory*, *22*(4), 403–426. <https://doi.org/10.1111/j.1468-2885.2012.01416.x>
- Henrich, J. (2020). *The WEIRD People in the World: How the West Became Psychologically Peculiar and Particularly Prosperous*. Farrar, Straus and Giroux.
- Hertlein, K. M. (2012). Digital dwelling: Technology in couple and family relationships. *Family Relations*, *61*(3), 374–387. <https://doi.org/10.1111/j.1741-3729.2012.00702.x>
- Hessel, H., & Dworkin, J. (2017). Emerging adults' use of communication technology with family members: A systematic review. *Adolescent Research Review*, *3*(3), 357–373. <https://doi.org/10.1007/s40894-017-0064-1>
- Hodge, C. J., Zabriskie, R. B., Fellingham, G., Coyne, S., Lundberg, N. R., Padilla-Walker, L. M., & Day, R. D. (2012). The relationship between media in the home and family functioning in context of leisure. *Journal of Leisure Research*, *44*(3), 285–307. <https://doi.org/10.1080/00222216.2012.11950266>
- Hrdy, S. B. (2009). *Mothers and Others. The Evolutionary Origins of Mutual Understanding*. Harvard University Press.
- Hughes, A. L. (1988). *Evolution and Human Kinship*. Oxford University Press.
- Hutto, C. J., Bell, C., Farmer, S., Fausset, C., Harley, L., Nguyen, J., & Fain, B. (2015). Social media gerontology: Understanding social media usage among older adults. *Web Intelligence*, *13*(1), 69–87. <https://doi.org/10.3233/web-150310>

- Imperato, C., & Mancini, T. (2019). ‘Couples in trouble’ because of social networks? A systematic review. *Psicologia Sociale*, 2, 165–204. <https://doi.org/10.1482/94265>
- Jin, B., & Peña, J. F. (2010). Mobile communication in romantic relationships: Mobile phone use, relational uncertainty, love, commitment, and attachment styles. *Communication Reports*, 23(1), 39–51. <https://doi.org/10.1080/08934211003598742>
- Jung, E. H., Walden, J., Johnson, A. C., & Sundar, S. S. (2017). Social networking in the aging context: Why older adults use or avoid Facebook. *Telematics and Informatics*, 34(7), 1071–1080. <https://doi.org/10.1016/j.tele.2017.04.015>
- Kaarakainen, M. T., & Saikkonen, L. (2022). Remark on digital accessibility: Educational disparities define digital inclusion from adolescence onwards. *Universal Access in the Information Society*, 2022. <https://doi.org/10.1007/s10209-022-00908-5>
- Kaye, L. K., Orben, A., Ellis, D. A., Hunter, S. C., & Houghton, S. (2020). The conceptual and methodological mayhem of “screen time”. *International Journal of Environmental Research and Public Health*, 17(10), 3661. <https://doi.org/10.3390/ijerph17103661>
- Kildare, C. A., & Middlemiss, W. (2017). Impact of parents mobile device use on parent-child interaction: A literature review. *Computers in Human Behavior*, 75, 579–593. <https://doi.org/10.1016/j.chb.2017.06.003>
- Kim, C., & Shen, C. (2020). Connecting activities on social network sites and life satisfaction: A comparison of older and younger users. *Computers in Human Behavior*, 105, 106222. <https://doi.org/10.1016/j.chb.2019.106222>
- Knitter, B., & Zemp, M. (2020). Digital family life: A systematic review of the impact of parental smartphone use on parent-child interactions. *Digital Psychology*, 1(1), 29–43. <https://doi.org/10.24989/dp.v1i1.1809>
- Kramer, K. L. (2010). Cooperative breeding and its significance to the demographic success of humans. *Annual Review of Anthropology*, 39(1), 417–436. <https://doi.org/10.1146/annurev.anthro.012809.105054>
- Kushlev, K., & Dunn, E. W. (2019). Smartphones distract parents from cultivating feelings of connection when spending time with their children. *Journal of Social and Personal Relationships*, 36(6), 1619–1639. <https://doi.org/10.1177/0265407518769387>
- Lanigan, J. D., Bold, M., & Chenoweth, L. (2009). Computers in the family context: Perceived impact on family time and relationships. *Family Science Review*, 14. <https://api.semanticscholar.org/CorpusID:141450519>
- Lazer, D. M. J., Pentland, A., Watts, D. J., Aral, S., Athey, S., Contractor, N., Freelon, D., Gonzalez-Bailon, S., King, G., Margetts, H., Nelson, A., Salganik, M. J., Strohmaier, M., Vespignani, A., & Wagner, C. (2020). Computational social science: Obstacles and opportunities. *Science*, 369(6507), 1060–1062. <https://doi.org/10.1126/science.aaz8170>
- Leggett, C., & Rossouw, P. (2014). The impact of technology use on couple relationships: A neuropsychological perspective. *International Journal of Neuropsychotherapy*, 2(1), 44–99. <https://doi.org/10.12744/ijnpt.2014.0044-0099>
- Li, C., Ning, G., Xia, Y., Guo, K., & Liu, Q. (2022). Does the Internet bring people closer together or further apart? The impact of Internet usage on interpersonal communications. *Behavioral Sciences*, 12(11), 425. <https://doi.org/10.3390/bs12110425>
- Lindell, A. K., Campione-Barr, N., & Killoren, S. E. (2015). Technology-mediated communication with siblings during the transition to college: Associations with relationship positivity and self-disclosure. *Family Relations*, 64, 563–578. <https://doi.org/10.1111/fare.12133>
- Liu, D., Ainsworth, S. E., & Baumeister, R. F. (2016). A meta-analysis of social networking online and social capital. *Review of General Psychology*, 20(4), 369–391. <https://doi.org/10.1037/gpr0000091>
- Liu, D., & Yang, C.-C. (2016). Media niche of electronic communication channels in friendship: A meta-analysis. *Journal of Computer-Mediated Communication: JCMC*, 21(6), 451–466. <https://doi.org/10.1111/jcc4.12175>

- Löckenhoff, C. E., & Carstensen, L. L. (2004). Socioemotional selectivity theory, aging, and health: the increasingly delicate balance between regulating emotions and making tough choices. *Journal of Personality, 72*(6), 1395–1424. <https://doi.org/10.1111/j.1467-6494.2004.00301.x>
- Lythreath, S., Singh, S. K., & El-Kassar, A.-N. (2022). The digital divide: A review and future research agenda. *Technological Forecasting and Social Change, 175*, 121359. <https://doi.org/10.1016/j.techfore.2021.121359>
- Määttä, S., Kaukonen, R., Vepsäläinen, H., Lehto, E., Ylönen, A., Ray, C., Erkkola, M., & Roos, E. (2017). The mediating role of the home environment in relation to parental educational level and preschool children's screen time: a cross-sectional study. *BMC Public Health, 17*(1), 688. <https://doi.org/10.1186/s12889-017-4694-9>
- Mantere, E. (2020). What smartphones, ethnomethodology, and bystander inaccessibility can teach us about better design? In Loizides, F., Winckler, M., Chatterjee, U., Abdelnour-Nocera, J. and Parmaxi, A (Ed.), *Human Computer Interaction and Emerging Technologies* (pp. 91–100). Cardiff University Press. <https://doi.org/10.13140/RG.2.2.29073.17764>
- Mascheroni, G., Ponte, C., & Jorge, A. (Eds.). (2018). *Digital Parenting*. Nordicom.
- McDaniel, B. T. (2015). Everyday intrusions and interruptions of technology in couple and family relationships. In C. J. Bruess (Ed.), *Family Communication in the Age of Digital and Social Media*. New York: Peter Lang Publishing.
- McDaniel, B. T., & Coyne, S. M. (2016a). “Technoference”: The interference of technology in couple relationships and implications for women's personal and relational well-being. *Psychology of Popular Media Culture, 5*(1), 85–98. <https://doi.org/10.1037/ppm0000065>
- McDaniel, B. T., & Coyne, S. M. (2016b). Technology interference in the parenting of young children: Implications for mothers' perceptions of coparenting. *The Social Science Journal, 53*(4), 435–443. <https://doi.org/10.1016/j.soscij.2016.04.010>
- McDaniel, B. T., & Drouin, M. (2019). Daily technology interruptions and emotional and relational well-being. *Computers in Human Behavior, 99*, 1–8. <https://doi.org/10.1016/j.chb.2019.04.027>
- McDaniel, B. T., Galovan, A. M., Cravens, J. D., & Drouin, M. (2017). “Technoference” and implications for mothers' and fathers' couple and coparenting relationship quality. *Computers in Human Behavior, 80*, 303–313. <https://doi.org/10.1016/j.chb.2017.11.019>
- McDaniel, B. T., & Radesky, J. S. (2018a). Technoference: Parent distraction with technology and associations with child behavior problems. *Child Development, 89*(1), 100–109. <https://doi.org/10.1111/cdev.12822>
- McDaniel, B. T., & Radesky, J. S. (2018b). Technoference: longitudinal associations between parent technology use, parenting stress, and child behavior problems. *Pediatric Research, 84*(2), 210–218. <https://doi.org/10.1038/s41390-018-0052-6>
- Modecki, K. L., Goldberg, R. E., Wisniewski, P., & Orben, A. (2022). What Is Digital Parenting? A Systematic Review of Past Measurement and Blueprint for the Future. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science, 17*(6), 1673–1691. <https://doi.org/10.1177/17456916211072458>
- Morey, J. N., Gentzler, A. L., Creasy, B., Oberhauser, A. M., & Westerman, D. (2013). Young adults' use of communication technology within their romantic relationships and associations with attachment style. *Computers in Human Behavior, 29*(4), 1771–1778. <https://doi.org/10.1016/j.chb.2013.02.019>
- Muise, A., Christofides, E., & Desmarais, S. (2009). More information than you ever wanted: does Facebook bring out the green-eyed monster of jealousy? *Cyberpsychology & Behavior, 12*(4), 441–444. <https://doi.org/10.1089/cpb.2008.0263>
- Mullan, K., & Chatzitheochari, S. (2019). Changing times together? A time-diary analysis of family time in the digital age in the United Kingdom. *Family Relations, 81*(4), 795–811. <https://doi.org/10.1111/jomf.12564>
- Myruski, S., Gulyayeva, O., Birk, S., Pérez-Edgar, K., Buss, K. A., & Dennis-Tiway, T. A. (2017). Digital disruption? Maternal mobile device use is related to infant social-emotional functioning. *Developmental Science, 21*(4), e12610. <https://doi.org/10.1111/desc.12610>


- Nef, T., Ganea, R. L., Müri, R. M., & Mosimann, U. P. (2013). Social networking sites and older users: A systematic review. *International Psychogeriatrics*, 25(7), 1041–1053. <https://doi.org/10.1017/S1041610213000355>
- Nelson, J. J. (2019). Pass the iPad: Assessing the relationship between tech use during family meals and parental reports of closeness to their children. *The Sociological Quarterly*, 60(4), 696–715. <https://doi.org/10.1080/00380253.2019.1580548>
- Neves, B. B. (2015). Does the Internet matter for strong ties? Bonding social capital, Internet use, and age-based inequality. *International Review of Sociology*, 25(3), 415–433. <https://doi.org/10.1080/03906701.2015.1050307>
- Neves, B. B., Franz, R., Judges, R., Beerermann, C., & Baecker, R. (2017). Can digital technology enhance social connectedness among older adults? A feasibility study. *Journal of Applied Gerontology: The Official Journal of the Southern Gerontological Society*, 38(1), 49–72. <https://doi.org/10.1177/0733464817741369>
- Newman, L., Stoner, C., & Spector, A. (2019). Social networking sites and the experience of older adult users: a systematic review. *Ageing & Society*, 41(2), 377–402. <https://doi.org/10.1017/S0144686X19001144>
- Nguyen, M. H., Hunsaker, A., & Hargittai, E. (2020). Older adults' online social engagement and social capital: The moderating role of Internet skills. *Information, Communication and Society*, 25(7), 942–958. <https://doi.org/10.1080/1369118X.2020.1804980>
- Nikken, P., & Oprea, S. J. (2018). Guiding young children's digital media use: SES-differences in mediation concerns and competence. *Journal of Child and Family Studies*, 27(6), 1844–1857. <https://doi.org/10.1007/s10826-018-1018-3>
- Nongpong, S., & Charoensukmongkol, P. (2016). I don't care much as long as I am also on Facebook: Impacts of social media use of both partners on romantic relationship problems. *The Family Journal*, 24(4), 351–358. <https://doi.org/10.1177/10664807166663199>
- Núñez, T. R., & Radtke, T. (2023). Is socially disruptive smartphone use detrimental to well-being? A systematic meta-analytic review on being phubbed. *Behaviour & Information Technology*, 1–29. <https://doi.org/10.1080/0144929X.2023.2209213>
- O'Leary, D., & Volkmer, S. A. (2021). Are the negative effects of social networking a privilege of the rich? Social network usage and life satisfaction across European countries. *Computers in Human Behavior Reports*, 3, 100078. <https://doi.org/10.1016/j.chbr.2021.100078>
- OSF. (2020). *Use of the Internet for following the media and for communication has increased*. Statistics Finland. https://www.stat.fi/til/sutivi/2020/sutivi_2020_2020-11-10_tie_001_en.html
- OSF. (2021). *Total working hours of women and men on the same level for the first time in 2020 to 2021*. Statistics Finland. <https://www.stat.fi/en/publication/cku2d1we88fu70b506ua4x5tp>
- Oulasvirta, A., Rattenbury, T., Ma, L., & Raita, E. (2012). Habits make smartphone use more pervasive. *Personal and Ubiquitous Computing*, 16(1), 105–114. <https://doi.org/10.1007/s00779-011-0412-2>
- Padilla-Walker, L. M., Coyne, S. M., & Fraser, A. M. (2012). Getting a high-speed family connection: Associations between family media use and family connection. *Family Relations*, 61(3), 426–440. <https://doi.org/10.1111/j.1741-3729.2012.00710.x>
- Perrin, A. (2017). *10 facts about smartphones as the iPhone turns 10*. Pew Research Center. <https://www.pewresearch.org/fact-tank/2017/06/28/10-facts-about-smartphones/>
- Pollet, T. V. (2007). Genetic relatedness and sibling relationship characteristics in a modern society. *Evolution and Human Behavior: Official Journal of the Human Behavior and Evolution Society*, 28(3), 176–185. <https://doi.org/10.1016/j.evolhumbehav.2006.10.001>
- Pollet, T. V., & Hoben, A. D. (2011). An evolutionary perspective on siblings: Rivals and resources. In C. A. Salmon & T. K. Shackelford (Eds.), *The Oxford Handbook on Evolutionary Family Psychology* (pp. 128–148). Oxford University Press.
- Przybylski, A. K., & Weinstein, N. (2019). Digital screen time limits and young children's psychological well-being: Evidence from a population-based study. *Child Development*, 90(1), e56–e65. <https://doi.org/10.1111/cdev.13007>

- Quan-Haase, A., Wang, H., Wellman, B., & Zhang, R. (2018). Weaving family connections on- and offline: the turn to networked individualism. In *Connecting Families?: Information and Communication Technologies, Generations, and the Life Course* (pp. 59–80). Bristol University Press. <https://doi.org/10.46692/9781447339953.005>
- Radesky, J., Leung, C., Appugliese, D., Miller, A. L., Lumeng, J. C., & Rosenblum, K. L. (2018). Maternal mental representations of the child and mobile phone use during parent-child mealtimes. *Journal of Developmental and Behavioral Pediatrics, 39*(4), 310–317. <https://doi.org/10.1097/DBP.0000000000000556>
- Radesky, J., Miller, A. L., Rosenblum, K. L., Appugliese, D., Kaciroti, N., & Lumeng, J. C. (2015). Maternal mobile device use during a structured parent-child interaction task. *Academic Pediatrics, 15*(2), 238–244. <https://doi.org/10.1016/j.acap.2014.10.001>
- Rainie, L., Kiesler, S., Kang, R., & Madden, M. (2013). *Anonymity, privacy, and security online*. Pew Research Center. <https://www.pewresearch.org/internet/2013/09/05/anonymity-privacy-and-security-online/>
- Rains, S. A., & Tsetsi, E. (2017). Social support and digital inequality: Does Internet use magnify or mitigate traditional inequities in support availability? *Communication Monographs, 84*(1), 54–74. <https://doi.org/10.1080/03637751.2016.1228252>
- Ramirez, A., Dimmick, J., Feaster, J., & Lin, S.-F. (2008). Revisiting interpersonal media competition: The gratification niches of instant messaging, e-mail, and the telephone. *Communication Research, 35*(4), 529–547. <https://doi.org/10.1177/0093650208315979>
- Ramsey, M. A., Gentzler, A. L., Morey, J. N., Oberhauser, A. M., & Westerman, D. (2013). College students' use of communication technology with parents: comparisons between two cohorts in 2009 and 2011. *Cyberpsychology, Behavior and Social Networking, 16*(10), 747–752. <https://doi.org/10.1089/cyber.2012.0534>
- Reisdorf, B. C., Petrovčič, A., & Grošelj, D. (2021). Going online on behalf of someone else: Characteristics of Internet users who act as proxy users. *New Media & Society, 23*(8), 2409–2429. <https://doi.org/10.1177/1461444820928051>
- Richter, D., Bannier, S., Glott, R., Marquard, M., & Schwarze, T. (2013). Are Internet and social network usage associated with wellbeing and social inclusion of seniors? The third age online survey on digital media use in three European countries. In C. Stephanidis & M. Antona (Eds.), *Universal access in human-computer interaction. User and context diversity* (Vol. 211, pp. 211–220). Springer, Berlin.
- Rideout, V. (2017). *The Common Sense census: Media use by kids age zero to eight*. Common Sense Media. <https://www.commonsensemedia.org/sites/default/files/research/report/2019-new-normal-parents-teens-screens-and-sleep-united-states-report.pdf>
- Robb, M. B. (2019). *The new normal: Parents, teens, screens, and sleep in the United States*. Common Sense Media. <https://www.commonsensemedia.org/sites/default/files/uploads/research/2019-new-normal-parents-teens-screens-and-sleep-united-states.pdf>
- Roberts, J. A., & David, M. E. (2016). My life has become a major distraction from my cell phone: Partner phubbing and relationship satisfaction among romantic partners. *Computers in Human Behavior, 54*, 134–141. <https://doi.org/10.1016/j.chb.2015.07.058>
- Roberts, S. G. B., & Dunbar, R. I. M. (2011). The costs of family and friends: an 18-month longitudinal study of relationship maintenance and decay. *Evolution and Human Behavior, 32*(3), 186–197. <https://doi.org/10.1016/j.evolhumbehav.2010.08.005>
- Robinson, L., Cotten, S. R., Ono, H., Quan-Haase, A., Mesch, G., Chen, W., Schulz, J., Hale, T. M., & Stern, M. J. (2015). Digital inequalities and why they matter. *Information, Communication and Society, 18*(5), 569–582. <https://doi.org/10.1080/1369118X.2015.1012532>
- Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika, 70*(1), 41–55. <https://doi.org/10.1093/biomet/70.1.41>
- Rosenberg, D., & Taipale, S. (2022). Social and satisfied? Social uses of mobile phone and subjective wellbeing in later life. *Human Technology, 18*(1), 45–65. <https://doi.org/10.14254/1795-6889.2021>

- Rus, H. M., & Tiemensma, J. (2017). "It's complicated." A systematic review of associations between social network site use and romantic relationships. *Computers in Human Behavior*, 75, 684–703. <https://doi.org/10.1016/j.chb.2017.06.004>
- Sarmaja, H. (2003). Ihmislajin perheenmuodostuksen evoluutiopsykologinen perusta. *Yhteiskuntapolitiikka*, 68(3), 223–243.
- Sbarra, D. A., Briskin, J. L., & Slatcher, R. B. (2019). Smartphones and close relationships: The case for an evolutionary mismatch. *Perspectives on Psychological Science*, 14(4), 596–618. <https://doi.org/10.1177/1745691619826535>
- Schade, L. C., Sandberg, J., Bean, R., Busby, D., & Coyne, S. (2013). Using technology to connect in romantic relationships: Effects on attachment, relationship satisfaction, and stability in emerging adults. *Journal of Couple & Relationship Therapy*, 12(4), 314–338. <https://doi.org/10.1080/15332691.2013.836051>
- Scheerder, A., van Deursen, A., & van Dijk, J. (2017). Determinants of Internet skills, uses and outcomes. A systematic review of the second- and third-level digital divide. *Telematics and Informatics*, 34(8), 1607–1624. <https://doi.org/10.1016/j.tele.2017.07.007>
- Scheibehenne, B., Greifeneder, R., & Todd, P. M. (2010). Can There Ever Be Too Many Options? A Meta-Analytic Review of Choice Overload. *The Journal of Consumer Research*, 37(3), 409–425. <https://doi.org/10.1086/651235>
- Sharaievska, I. (2017). Updating the family operating system: A literature review of information communication technology and family leisure. *Leisure Sciences*, 39(5), 400–414. <https://doi.org/10.1080/01490400.2017.1333058>
- Sheldon, P. (2012). Profiling the non-users: Examination of life-position indicators, sensation seeking, shyness, and loneliness among users and non-users of social network sites. *Computers in Human Behavior*, 28(5), 1960–1965. <https://doi.org/10.1016/j.chb.2012.05.016>
- Shen, C., Wang, M. P., Chu, J. T., Wan, A., Viswanath, K., Chan, S. S. C., & Lam, T. H. (2017). Sharing family life information through video calls and other information and communication technologies and the association with family well-being: Population-based survey. *JMIR Mental Health*, 4(4), e57. <https://doi.org/10.2196/mental.8139>
- Simons, M., Reijnders, J., Peeters, S., Janssens, M., Lataster, J., & Jacobs, N. (2021). Social network sites as a means to support personal social capital and well-being in older age: An association study. *Computers in Human Behavior Reports*, 3, 100067. <https://doi.org/10.1016/j.chbr.2021.100067>
- Sims, T., Reed, A. E., & Carr, D. C. (2017). Information and communication technology use is related to higher well-being among the oldest-old. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 72(5), 761–770. <https://doi.org/10.1093/geronb/gbw130>
- Skaug, S., Englund, K. T., Saksvik-Lehouillier, I., Lydersen, S., & Wichstrøm, L. (2018). Parent-child interactions during traditional and interactive media settings: A pilot randomized control study. *Scandinavian Journal of Psychology*, 59(2), 135–145. <https://doi.org/10.1111/sjop.12420>
- Stiglic, N., & Viner, R. M. (2019). Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. *BMJ Open*, 9(1), e023191. <https://doi.org/10.1136/bmjopen-2018-023191>
- Stockdale, L. A., Coyne, S. M., & Padilla-Walker, L. M. (2018). Parent and child technofence and socioemotional behavioral outcomes: A nationally representative study of 10- to 20-year-old adolescents. *Computers in Human Behavior*, 88, 219–226. <https://doi.org/10.1016/j.chb.2018.06.034>
- Storch, S. L., & Ortiz Juarez-Paz, A. V. (2019). The role of mobile devices in 21st-century family communication. *Mobile Media & Communication*, 7(2), 248–264. <https://doi.org/10.1177/2050157918811369>
- Taipale, S. (2019). *Intergenerational Connections in Digital Families*. Springer, Cham. <https://doi.org/10.1007/978-3-030-11947-8>
- Tanskanen, A. O., & Danielsbacka, M. (2019). *Intergenerational Family Relations: An Evolutionary Social Science Approach*. Routledge.
- Tinbergen, N. (1963). On aims and methods of ethology. *Zeitschrift Für Tierpsychologie*, 20, 410–433. <https://doi.org/10.1111/j.1439-0310.1963.tb01161.x>

- Trivers, R. (2002). *Natural selection and social theory: Selected papers of Robert Trivers* (R. Trivers, Ed.). Oxford University Press.
- Turkle, S. (2011). *Alone Together: Why We Expect More from Technology and Less from Each Other*. Basic Books. <https://play.google.com/store/books/details?id=NgYUnWEACAAJ>
- Twenge, J. M. (2017). *iGen: Why today's super-connected kids are growing up less rebellious, more tolerant, less happy and completely unprepared for adulthood*. Atria Books.
- Twenge, J. M., Spitzberg, B. H., & Campbell, W. K. (2019). Less in-person social interaction with peers among U.S. adolescents in the 21st century and links to loneliness. *Journal of Social and Personal Relationships*, 36(6), 1892–1913. <https://doi.org/10.1177/0265407519836170>
- Uhls, Y. T., Michikyan, M., Morris, J., Garcia, D., Small, G. W., Zgourou, E., & Greenfield, P. M. (2014). Five days at outdoor education camp without screens improves preteen skills with nonverbal emotion cues. *Computers in Human Behavior*, 39, 387–392. <https://doi.org/10.1016/j.chb.2014.05.036>
- Utz, S., & Beukeboom, C. J. (2011). The role of social network sites in romantic relationships: Effects on jealousy and relationship happiness. *Journal of Computer-Mediated Communication*, 16(4), 511–527. <https://doi.org/10.1111/j.1083-6101.2011.01552.x>
- Valenzuela, S., Halpern, D., & Katz, J. E. (2014). Social network sites, marriage well-being and divorce: Survey and state-level evidence from the United States. *Computers in Human Behavior*, 36, 94–101. <https://doi.org/10.1016/j.chb.2014.03.034>
- van Deursen, A. J. A., & Helsper, E. J. (2015). The third-level digital divide: Who benefits most from being online? In *Communication and Information Technologies Annual (Studies in Media and Communications, Vol. 10)* (Vol. 10, pp. 29–52). Emerald Group Publishing Limited. <https://doi.org/10.1108/S2050-206020150000010002>
- van Deursen, A. J. A. M., Courtois, C., & van Dijk, J. A. G. M. (2014). Internet skills, sources of support, and benefiting from Internet use. *International Journal of Human-Computer Interaction*, 30(4), 278–290. <https://doi.org/10.1080/10447318.2013.858458>
- Verduyn, P., Schulte-Strathaus, J. C. C., Kross, E., & Hülshager, U. R. (2021). When do smartphones displace face-to-face interactions and what to do about it? *Computers in Human Behavior*, 114, 106550. <https://doi.org/10.1016/j.chb.2020.106550>
- Verduyn, P., Ybarra, O., Résibois, M., Jonides, J., & Kross, E. (2017). Do social network sites enhance or undermine subjective well-being? A critical review. *Social Issues and Policy Review*, 11(1), 274–302. <https://doi.org/10.1111/sipr.12033>
- Vilhelmson, B., Thulin, E., & Eldér, E. (2016). Where does time spent on the Internet come from? Tracing the influence of information and communications technology use on daily activities. *Information, Communication & Society*, 20(2), 250–263. <https://doi.org/10.1080/1369118X.2016.1164741>
- Viner, R., Davie, M., & Firth, A. (2019). *The Health Impacts of Screen Time: A Guide for Clinicians and Parents*. Royal College of Paediatrics and Child Health. https://www.rcpch.ac.uk/sites/default/files/2018-12/rcpch_screen_time_guide_-_final.pdf
- Vogels, E. A. (2019). Millennials stand out for their technology use, but older generations also embrace digital life. *Pew Research Center*. <https://pewrsr.ch/2A3kD6X>
- Vossler, A. (2016). Internet infidelity 10 years on: A critical review of the literature. *The Family Journal*, 24(4), 359–366. <https://doi.org/10.1177/1066480716663191>
- Wang, B., Taylor, L., & Sun, Q. (2018). Families that play together stay together: Investigating family bonding through video games. *New Media & Society*, 20(11), 4074–4094. <https://doi.org/10.1177/1461444818767667>
- Wang, M. P., Chu, J. T. W., Viswanath, K., Wan, A., Lam, T. H., & Chan, S. S. (2015). Using information and communication technologies for family communication and its association with family well-being in Hong Kong: FAMILY Project. *Journal of Medical Internet Research*, 17(8), e207. <https://doi.org/10.2196/jmir.4722>
- Wang, X., Xie, X., Wang, Y., Wang, P., & Lei, L. (2017). Partner phubbing and depression among married Chinese adults: The roles of relationship satisfaction and relationship length. *Personality and Individual Differences*, 110, 12–17. <https://doi.org/10.1016/j.paid.2017.01.014>

- Waytz, A., & Gray, K. (2018). Does online technology make us more or less sociable? A preliminary review and call for research. *Perspectives on Psychological Science*, 13(4), 473–491. <https://doi.org/10.1177/1745691617746509>
- WHO. (2019). *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*. World Health Organization. <https://apps.who.int/iris/bitstream/handle/10665/311664/9789241550536-eng.pdf?sequence=1&isAllowed=y>
- Williams, A. L., & Merten, M. J. (2011). iFamily: Internet and social media technology in the family context. *Family and Consumer Sciences Research Journal*, 40(2), 150–170. <https://doi.org/10.1111/j.1552-3934.2011.02101.x>
- Wrzus, C., Hänel, 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. <https://doi.org/10.1037/a0028601>
- Wu, P.-L., & Chiou, W.-B. (2009). More options lead to more searching and worse choices in finding partners for romantic relationships online: an experimental study. *Cyberpsychology & Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society*, 12(3), 315–318. <https://doi.org/10.1089/cpb.2008.0182>
- Yang, Y. C., Boen, C., Gerken, K., Li, T., Schorpp, K., & Harris, K. M. (2015). Social relationships and physiological determinants of longevity across the human life span. *Proceedings of the National Academy of Sciences of the United States of America*, 113(3), 578–583. <https://doi.org/10.1073/pnas.1511085112>
- Yu, R. P. (2020). Use of messaging apps and social network sites among older adults: A mixed-method study. *International Journal of Communication*, 14, 4453–4473.
- Yu, R. P., Ellison, N. B., McCammon, R. J., & Langa, K. M. (2016). Mapping the two levels of digital divide: Internet access and social network site adoption among older adults in the USA. *Information, Communication and Society*, 19(10), 1445–1464. <https://doi.org/10.1080/1369118X.2015.1109695>
- Zheng, S., Duan, Y., & Ward, M. R. (2019). The effect of broadband internet on divorce in China. *Technological Forecasting and Social Change*, 139, 99–114. <https://doi.org/10.1016/j.techfore.2018.07.038>
- Zickuhr, K., & Madden, M. (2012). *Older adults and Internet use*. Pew Research Center. <http://www.pewresearch.org/internet/2012/06/06/main-report-15>
- Zoppolat, G., Righetti, F., Balzarini, R. N., Alonso-Ferres, M., Urganci, B., Rodrigues, D. L., Debrot, A., Wiwattanapantuwong, J., Dharma, C., Chi, P., Karremans, J. C., Schoebi, D., & Slatcher, R. B. (2022). Relationship difficulties and ‘technoferece’ during the COVID-19 pandemic. *Journal of Social and Personal Relationships*, 39(11), 3204–3227. <https://doi.org/10.1177/02654075221093611>



The digital revolution has transformed time use and communication in families. Technology and technology use practices in families have repercussions not only for individuals and their relationships, but also for societies at large. This multidisciplinary thesis draws on theories from evolutionary psychology, sociology, and communication studies to examine the underlying mechanisms through which technology influences and shapes family relationships. The thesis argues that even in the context of today's communication technology both connection and disconnection in family relationships display aspects of evolved family psychology. On the societal level, the thesis examines the divides that ICT has created between demographics, i.e., how family resources and life stages determine the ways in which technology affects family relationships. In discussing such divides, the thesis advances the underrecognized family perspective in the digital divides literature.



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