ABSTRACT

Title of Dissertation:	FACTORS CONTRIBUTING TO THE EXPERIENCE OF STATE LONELINESS
	R. Gordon Rinderknecht, Doctor of Philosophy, 2020
Dissertation directed by:	Professor Jeffrey W. Lucas, Department of Sociology Assistant Professor Long Doan, Department of Sociology

In this dissertation, I examine the factors that contribute to the experience of loneliness in daily life (i.e., state loneliness). In the first study, I propose that being alone is most likely to lead to feelings of loneliness when a person is expected to be social, relative to moments when there is less of an expectation to be social. In the second study, I propose that how people engage with others has implications for how lonely they will feel in a situation, and that the importance of how they engage with others will partly depend on the kinds of people present in the situation. In the third study, I propose that engagement with romantic partners will be less beneficial for avoiding state loneliness when experiencing work-schedule conflict, due to the detriment such conflict may have on relationship quality.

The lack of research on state loneliness is related to the difficulty of collecting data during or near the moment in which it is experienced. In this dissertation, I

overcome this challenge by developing a platform that allowed participants to conveniently provide the time-diary data utilized in all three studies. In Study 1, I found, as expected, that participants felt loneliest when isolated during normatively social times. Unexpectedly, normatively social activities and locations did not associate with the strongest feelings of state loneliness. Results for Study 2 came out largely as expected—engaging in a shared task (active engagement) associated with lower rates of state loneliness relative to mere co-presence (passive engagement), and the benefit of active over passive engagement was strongest among weak ties and, unexpectedly, family members. Lastly, as expected, results from Study 3 show that work-schedule conflict associated with heightened loneliness when engaging with romantic partners. Unexpectedly, this appears to be less related to relationship quality between romantic partners and more related to the association between work-schedule conflict and participants reporting being generally lonely. Results from these studies show how factors ranging from broad cultural beliefs to small changes in engagement influence the experience of loneliness throughout a day, while unexpected findings highlight the need for further research.

FACTORS CONTRIBUTING TO THE EXPERIENCE OF STATE LONELINESS

by

Robert Gordon Rinderknecht

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2020

Advisory Committee:
Professor Jeffrey W. Lucas, Co-chair
Assistant Professor Long Doan, Co-chair
Professor Liana C. Sayer
Professor Rashawn Ray
Professor Wayne McIntosh

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

In this dissertation, I seek to identify the conditions that lead to momentary feelings of social isolation (i.e., state loneliness). Debate continues over whether Americans are growing more socially isolated (Parigi and Henson 2014). Putnam (2001) claimed that Americans are increasingly avoiding virtually all forms of voluntary association, including face-to-face contact. Since then, this perspective has found both empirical support (McPherson, Smith-Lovin, and Brashears 2006; Twenge, Martin, and Campbell 2018) and criticism (Durlauf 2002; Fischer 2009; Hua Wang and Wellman 2010). Regardless of which side is correct, approximately half (46%) of Americans already report "sometimes or always" feeling alone (Cigna and Ipsos 2018). Persistent feelings of loneliness constitute a major risk factor for health—on par with cigarette smoking, blood pressure, and obesity (House, Landis, and Umberson 1988). Confronting the broad and potentially expanding health challenge posed by loneliness requires a greater understanding of the "harbingers of loneliness" (Hawkley et al. 2008) that are open to intervention (Luanaigh and Lawlor 2008). In this dissertation, I assess these harbingers both while individuals are in the presence of others and while alone. To do so, I develop theory that ties loneliness to expectations, refines the association between tie-strength and loneliness, and investigates the effect work-schedule conflict has on one of people's most important ties—romantic partners. Further, I propose a method for testing my hypotheses that is capable of collecting detailed data about participants' daily lives.

Loneliness originates from a mismatch between desired and experienced social engagement (Peplau and Perlman 1982). When people experience less engagement than they desire, or engagement that is not of sufficient quality, they are then likely to become

lonely. Research typically seeks to understand the experience of this mismatch by focusing on the demographic correlates of loneliness, including education (Savikko et al. 2005), employment status (Hawkley, Browne, and Cacioppo 2005), health, age, marital status, and income (Hawkley et al. 2008). These factors matter because they are associated with the quantity and quality of relationships in people's lives (Hawkley et al. 2008). Yet, although valuable, this research does not assess the momentary experience of people's lives, and therefore leaves many situation-level sources of loneliness unexplored. Recent research has started to assess the momentary correlates of loneliness but much remains unknown about how loneliness is experienced in people's daily lives (van Roekel et al. 2018).

In this dissertation, I directly assess the momentary experience of loneliness in order to gain a better understanding of how loneliness changes from moment to moment, across an entire waking day. I begin by focusing on how the expectation to be social moderates the relationship between social isolation and loneliness. I propose that being alone will be most detrimental when it occurs in normatively social situations. Next, I build on previous findings showing a relationship between tie-strength and loneliness—that loneliness tends to be lowest when in the presence of stronger ties (van Roekel et al. 2016, 2018). I do so by further refining what it means to be with others, which I propose in turn affects how beneficial strong-tie interactions are over weak-tie interactions. I propose that direct forms of engagement associate with feelings of closeness and connection, which benefits weak-tie interactions more so than strong-tie interactions due to interactions with strong ties already featuring these feelings of connection. Lastly, beyond identifying the situational conditions that lead to loneliness, I seek to identify

why some kinds of people benefit from the presence of their ties differently. Specifically, I propose that schedule conflict that undercuts time spent with partners will degrade relationship quality and therefore reduce the value of romantic partner interaction for reducing loneliness. Overall, in this dissertation, I focus on a factor which will help identify the conditions under which loneliness is experienced while isolated (expectations), a factor which I propose will help identify the conditions under which loneliness is experienced while in the presence of others (tie-strength), and a factor explaining why some people will benefit less than others from the presence of one of their strongest ties (work-schedule conflict).

I test my hypotheses using time-diary data collected from graduate students and online participants. Both samples completed an introductory survey and had the opportunity to complete multiple time diaries. In the time diaries, participants reported on each major activity they engaged in across a day, the duration of each activity, and contextual information for each of these time periods. These contextual data include the presence of others, location, multitasking, and emotion, including self-reported loneliness during the activity. These data therefore allow me to know who someone was with and what they were doing during periods of loneliness. In Study 1, I utilize evaluations of how social a person is expected to be while engaging in certain activities, in certain locations, and during certain times of the day and week. I merge these data with the time-diary data to assess how these expectations associate with the experience of loneliness while participants are alone. In Study 2, I focus on the interaction between who a person engages with (strong vs weak tie) and how they engage with them (actively vs passively). In Study 3, I assess the extent to which experiencing difficulty finding time to be with an

individual's romantic partner associates with an increased level of loneliness when in the presence of this partner, and I assess how feelings of closeness and connection in the situation explain this relationship. All analyses use random-intercept models to account for the clustering of activities within participant.

Results from Study 1 show, as expected, that people feel loneliest when isolated during normatively social times, relative to isolation during less normatively social times. However, normatively social activities and locations did not elicit the expected increase in loneliness during isolation. Rather, participants consistently benefitted from the presence of others while eating, during leisure, and while at home, while consistently benefitting the least during work (as both an activity and a location). Results from Study 2 largely aligned with my hypotheses: the presence of strong ties associated with less loneliness than did the presence of weak ties, and directly engaging with others (active engagement) associated with less loneliness than did co-presence without engagement (passive engagement). Further, as expected, the reduction in loneliness between active and passive engagement was greatest for weak ties, relative to strong ties. Lastly, results from Study 3 only partially supported my hypotheses. As expected, as participants reported greater difficulty finding time to be with partners due to work-schedule conflicts, engagement with romantic partners associated with greater loneliness. However, feelings of closeness in the situation did not explain this relationship. Rather, the relationship appears related to the association between work-schedule conflict and general feelings of loneliness (i.e., trait loneliness, rather than loneliness specific to the situation).

My findings make several contributions, both theoretical and methodological. Connecting loneliness research with research on expectations should help to further predict the kinds of moments when loneliness is likely to be at its most severe. My findings also indicate that the value of weak ties is partly dependent on aspects of the situation, as well as indicates that along with its myriad other negative qualities, work-schedule conflict also associates with the experience of loneliness. A primary methodical finding is that recording the mere presence of others may be insufficient for understanding the experience of loneliness. Beyond loneliness, the platform I developed to facilitate my research is a contribution due to its ability to facilitate the rapid collection of time-use data, both for my own research and for the numerous other studies that rely on this platform.

In the next section, I discuss this instrument further after first providing an overarching view of my samples and method used throughout this dissertation. I begin by overviewing the sources of my data and the demographic and health differences between these sources of data. Although the sources differ in their demographic makeup, I find self-reported mental and physical health to be fairly similar between each sample. Next, I focus on why I chose to use time diaries, and I conclude by discussing how I developed the time-diary instrument participants used to provide the data reported in subsequent chapters. Lastly, I conclude by briefly overviewing the focus of each chapter in this dissertation.

Participants, Method Selection, and Instrument Development

Participants

Data in this dissertation were collected from graduate students (n = 627), Amazon's Mechanical Turk (n = 147), and Prolific Academic (n = 163).[1] The graduate student data are part of a project assessing student workload and work/life balance. These participants had the opportunity to report up to eight time diaries across the Fall 2018 semester. Mechanical Turk (MTurk) and Prolific Academic (PA) are both online platforms for connecting employers with workers. Both platforms have been found to be sources of quality data (Peer et al. 2017). Although MTurk is more popular, PA has several advantages over MTurk for my research, including transparency regarding the sample of available participants by demographics, greater geographic and demographic diversity, and ease of use (Palan and Schitter 2018). I therefore decided to split data collection between MTurk and PA to assess participant differences in future research. These participants had the opportunity to provide data for up to three days between February and early March 2020.

The data collected from graduate students and online participants are largely similar, although data collected from MTurk and PA are more detailed. For example, only the MTurk and PA datasets contain the measures of work-schedule conflict necessary for the analysis in ch.4. However, although less detailed in some ways, the data collected from graduate students are still valuable to this dissertation. This is because these graduate students reported engaging in a broad range of situations of interest to

[1] In this dissertation, I only include data from participants who completed at least one time diary.

chapters 2 and 3. They, for example, reported a wide range of time spent alone, time spent in the presence of others, and time spent directly engaged with others. They also reported a large amount of time spent with both strong and weak ties, as well as time spent alone and time spent with others during normatively social moments. Despite some graduate students tending to suffer from issues of social isolation (Dix 2007; Hefner and Eisenberg 2009), this sample of graduate students exhibited a wide enough range of variability in their daily lives to speak to many of my hypotheses. Further, graduate students may be interesting to contrast with the online samples due to their potentially different expectations to be social relative to non-graduate students, due to their unusual lives. Given that I anticipate social expectations will be a central factor explaining why being isolated in some situations will lead to more loneliness than other situations, separately analyzing graduate students and online participants in ch.2 allows for a valuable test of the importance of social expectations for predicting loneliness.

Table 1.1: Demographics and Health by Sample (Mean/Proportion (SD))

		Grad	MTurk	PA
Race				
	White	.57	.81	.67
	Latinx	.05	.03	.04
	Black	.04	.08	.07
	Asian	.26	.02	.08
	Other Race	.02	.0	.04
	Multiracial	.07	.06	.1
Man		.34	.51	.39
Woman		.66	.49	.61
Heterosexual		.79	.88	.82
Sexual Minority		.21	.12	.18
Marital Status				
	Single	.41	.42	.34
	Other	.39	.18	.28
	Married	.2	.4	.37
Age		27.35 (4.77)	40.07 (11.36)	35.47 (11.63)
Work Status				
	Fully Employed	—	.65	.41
	Partially Employed	—	.16	.23
	Unemployed	—	.08	.11
	Retired	—	.03	.04
	Disabled	—	.02	.04
	Stay-at-Home Parent	—	.02	.07
	Other	—	.03	.1
Education				
	Less than HS	—	.01	.0
	HS/GED	—	.17	.14
	Some college	—	.23	.3
	Associates	—	.16	.12
	BA	—	.36	.27
	Masters	—	.07	.14
	Prof School	—	.01	.01
	Doctorate	—	.01	.03
Health				
	Mental Health	2.76 (1.05)	2.58 (1.23)	2.91 (1.15)
	Physical Health	3.26 (.92)	2.8 (1.03)	3.09 (.97)

Note: physical and mental health measures range from 1 to 5, with larger values indicating worse health.

Although I combine MTurk and PA samples in subsequent chapters, I keep these samples separate here and test differences between all three samples. Table 1.1 shows that these samples vary along many demographic factors. To begin, MTurk appears to be the least racially diverse, with 81% of this sample being White, compared to 67% of the PA sample and 57% of the graduate student sample. The MTurk sample also consists of the highest proportion of men and the highest proportion heteronormative participants. The graduate student sample is the youngest sample and consists of the lowest proportion of married individuals. Differences in racial composition ($X^2 = 72.69$, $p < .001$), gender ($X^2 = 43.92$, $p < .001$), heterosexuality ($X^2 = 6.47$, $p < .01$), and marital status ($X^2 = 45.44$, $p < .001$) are all statistically significant. Further, relative to the PA sample, the MTurk sample is significantly older ($p < .001$) and the graduate student sample is significantly younger ($p < .001$). The MTurk and PA samples also differ in work status, with a higher proportion of MTurk participants reporting being fully employed. The differences in work status between MTurk and PA is statistically significant ($X^2 = 21.09$, $p < .001$), however the difference between MTurk and PA in educational attainment is not statistically significant ($X^2 = 10.06$, *n.s.*).

Participants in all three samples answered the following two questions regarding their mental the physical health: “In general, how would you rate your mental health, including your mood and your ability to think?” and “In general, how would you rate your physical health?”. Response options included “Excellent”, “Very good”, “Good”, “Fair”, “Poor”, and “Prefer not to say”. After adjusting for the demographic factors each sample has in common (i.e., race, gender, sexual identity, marital status, and age), the PA

samples reported worse mental health than the graduate student sample, but neither the PA and MTurk samples nor the MTurk and graduate samples significantly differed in mental health. Although differences are statistically significant, the predicted mental health for each sample is between “Good” and “Very good”, but closest to “Good” for all samples. Analyses show that the graduate student sample reported worse physical health than the MTurk sample and marginally worse physical health than the PA sample, yet the predicted physical health for each sample was closer to “Good” than to either “Very Good” or “Fair”. Overall, despite some differences, all three samples appear similar in terms of mental and physical health. These findings remain largely unchanged regardless of whether or not I include control variables.

Method Selection

Participants finished the study by completing a preliminary survey and then completed one or more time diaries. The time diaries use the day reconstruction method (DRM) (Kahneman et al. 2004) to provide detailed measures of the activities participants engage in throughout each day of participation. Participants first began providing information for the previous or current day (up until the current time) by reporting what they were doing at midnight (e.g., “sleeping”) and how long this activity lasted (e.g., until 7 a.m.). If they reported an activity other than personal care (e.g., sleeping, grooming, sex), they were prompted to report who else was present, the location of the activity, secondary activities, and emotional and perceptual experiences occurring in this timespan (including loneliness). To complete a DRM time diary, participants reported this data for the full 24-hour day.

Although my research platform supports both DRM and ESM (i.e., experience-sampling methodology, which involves recording experiences as they occur, typically via an electronic device that prompts participants to report data multiple times a day (Pejovic et al. 2015)) my dissertation research only utilizes the DRM. Both DRM and ESM are capable of evaluating contextual details but the DRM has the advantage of providing full 24-hour coverage, while ESM would only be able to record a few moments of a day. Full 24-hour coverage is crucial because my hypotheses often compare wide variety of different kinds of situations (e.g., engaging in the same activity as others vs. only being around others or alone; being alone during a normatively social time vs. being alone during a situation that is not normatively social). Because I do not know how commonly people encounter these varying situations, I use the DRM because it captures the widest range of time within each day. Lastly, the DRM is less technically complex to deploy, since it does not require participants to install an app on their device. Using the DRM should therefore increase response rates relative to the ESM method.

Instrument Development

The platform used to collect time-diary data in this dissertation is the culmination of approximately three years of incremental development. I first began developing this platform in Java as an Android application capable of collecting both DRM and ESM data. Although it successfully collected both forms of data from online participants (Doan et al. 2017), follow-up surveys revealed two central features necessary to increase response rates: participants wanted to (1) complete the time diary in more than one sitting, and (2) they wanted to complete the time diary for both the previous day and the current day, up until the current time. To satisfy these requests, I transformed the

platform from being exclusively a mobile app to being a hybrid mobile/web application written in Angular, Ionic, and Python. Participants could now complete the DRM time diary via their computers or smartphones using a mobile-optimized website. Participants could also respond to ESM prompts using a simplified mobile app that directed participants to supply most data directly through the same mobile-optimized website. This second version was deployed successfully (Rinderknecht, Doan, and Sayer 2018). Follow-up surveys revealed significant improvements in ease of use, intuitiveness, and enjoyment relative the first version of this platform—however, participants reported no change in clarity of instructions. While version 2 significantly improved the usability of the platform, improvement was needed in how we instructed participants.

Both versions 1 and 2 of this platform delivered instructions upfront via a lengthy "training document", as well as a link to this document on the platform's homepage. Although the instructions were clear and easily available for those who wanted to revisit them, the processes of searching through the document was likely too burdensome. To reduce such burden, version 3 of the platform built off of version 2 while focusing heavily on integrating study instructions into the website itself. The most complicated parts of the platform now feature an instructions button that shows instructions relevant to the page participants are currently completing. Additional instruction reminders appear every time a participant begins completing a new time diary. Instructions can also appear programmatically if it appears that the participant is making an error. For example, when reporting an activity, the time diary watches for words indicating the participant might be double-barreling their response. An example of such a response could be "Worked at main job and then drove home". This response is problematic because it may lead my

analysis to overestimate the amount of time spent working, since it also includes time spent driving. The word “and” in this activity would trigger a prompt instructing the participant on how he or she should report these activities. Further, the platform watches for unusually long activities. If a participant reports engaging in an activity other than personal care (e.g., sleep) for more than six hours, the time diary reminds the participant that we are interested in the mundane activities that may have occurred in this timespan. Two focus groups (approximately 20 people total) provided feedback on this latest version. Although they highlighted aspects of the time diary that should receive more instruction, no participants reported difficulty understanding what they should be doing on each page of the time diary instrument. See Appendix A for more details about the time diary.

Dissertation Structure

This first chapter reviewed the general logic behind my dissertation, as well as overviewed my participants, the reasons for my method selection, and provided information about how my time-diary instruments works and how I developed this instrument to facilitate the research in the subsequent chapters. Chapter 2 focuses on expectations, social comparisons, and builds to my hypotheses regarding the relationship between expectations and loneliness, and then proceeds to overview Study 1. Chapter 3 focuses on the role of tie-strength in understanding loneliness and builds to my hypotheses regarding the relationship between tie-strength and engagement form on loneliness, and then proceeds to overview Study 2. Chapter 4 explores research on work-schedule conflict and its relevance to loneliness, and then proceeds to overview Study 3.

Chapter 5 is a general discussion of my findings and their implications for future research.

Chapter 2: Expectations

No research has assessed the interrelation of state loneliness and social isolation with what people do, where they do it, and when. There is, however, some loneliness research highlighting the importance of these contextual details for predicting loneliness. For example, research has assessed the differences in state loneliness between weekdays and weekends (van Roekel et al. 2018; Tam and Chan 2019) and the relationship between state loneliness and social media usage (Reissmann et al. 2018). The focus on context in this prior research appears largely descriptive, or it relies on theory that is specific to a particular activity—and in both cases this research lacks a theoretical motivation to assess the contextual conditions under which social isolation is most problematic across a wide array of situations. Put differently, although we know that state loneliness can be higher during weekdays (van Roekel et al. 2018), we do not know if social isolation is more likely to elicit a sense of state loneliness during weekdays or weekends. We also do not know which activities and locations are the most and least likely to associate with heightened feelings of loneliness when engaged in alone. By focusing on expectations for social behavior, I propose that timing, activity, and location contribute to making a moment more or less likely to elicit feelings of loneliness if experienced alone, depending on the extent to which people are expected to be social during this time, activity, and in this location. If successful, this approach would allow researchers to pinpoint where in the day someone is most at risk of feeling lonely, which may help shape effective social interventions.

To explain why expectations matter for loneliness, I begin by discussing theory regarding people's often critical views of their own social lives due to negative

comparisons with others. Following this, I rely on symbolic interaction and affect control theory to hypothesize the conditions under which people are likely to make these comparisons—which I propose will be most likely to occur when individuals violate expectations by being alone when expected to be social.

Social Comparison

People are motivated to ensure that their views of themselves are valid, and they do so by comparing their behavior, opinions, and emotions against some standard. In the absence of objective standards, people look to others for such comparisons (Festinger 1954; Merton 2000; Thoits 1995). People compare themselves with a broad array of others, especially those who are most similar to themselves. For example, happiness is related to income relative to others of the same race, sex, religion and age group, purportedly because these people act as reference groups for such comparisons (Pérez-Asenjo 2011). People also compare themselves against those they interact with routinely. For example, Rosenberg and Pearlin (1978) found the self-esteem of adults to be shaped by social class more so than the self-esteem of adolescents and children. They argue that this is due to adults having more opportunities for social comparison with others of different classes than do adolescents and children, who are more likely to spend their time in homogenous environments, such as schools and neighborhoods (Milkie, Warner, and Ray 2014). Typically, people also prefer to compare themselves with those who are slightly better off, especially if the comparison is made privately (Buunk and Gibbons 2007). People also compare themselves against salient cultural norms, such as the norm for thinness among women (Strahan et al. 2006). And further, people not only compare themselves with others but also with their past selves (Suls, Martin, and Wheeler 2002). Along with

feelings of happiness, beauty and wealth, research indicates that these diverse reference groups may also impact feelings of loneliness (Deri, Davidai, and Gilovich 2017; Peplau, Miceli, and Morasch 1982).

Loneliness originates in people experiencing less social engagement than they desire, and researchers propose that this desire is rooted in social comparison (Peplau et al. 1982). People are thought to compare themselves with similar others to determine the kind of social engagement they ought to experience. They may, for example, compare themselves to others at the same point in the life course and past selves (Peplau et al. 1982). People may also compare themselves against cultural norms. As an example, Dykstra (2009) proposes that Greeks are more likely than Fins to be lonely when alone due to Greeks having a greater expectation for social engagement than do Finns. While research proposes a connection between social comparisons, unsatisfied expectations, and loneliness, little empirical research has assessed the kind of social comparisons that lead to loneliness (Peplau et al. 1982). Because of this, it is unclear what sort of factors are most likely to shape expectations and elicit feelings of loneliness in daily life. A separate stream of research may provide a basis for identifying these expectations by connecting social comparisons with feelings of leading relatively less rich social lives (Deri et al. 2017).

Research finds that the social standards people compare themselves against are biased towards those who are exceptionally social, which leaves people with an inflated view of others' rates of social engagement (Deri et al. 2017). This is due to highly social others coming to mind more readily than less social others, as well as due to the structure of social networks leaving most people with fewer friends than their friends have (Deri et

al. 2017). This “friendship paradox” ultimately results in more contact with social butterflies than homebodies (Feld 1991). Both cognitive biases and social structure appear to elicit critical views of people’s own social lives, and such feelings of relative social impoverishment has been found to lead to lower life satisfaction when individuals are prompted to compare themselves against others (Deri et al. 2017). *When*, though, are people prompted to make these comparisons in their daily lives? In the next section, I draw from symbolic interaction to propose an answer that focuses on cultural norms attached to situations—specifically, I focus on the importance of norms stipulating how social people should be during certain activities, while in certain locations, and during different times of the day and week.

Symbolic Interaction

Symbolic interactionism (SI) is the foundation for almost all sociological theory regarding the self (Thoits and Virshup 1997). To SI, the most significant contextual variable guiding behavior and perception is the definition of the situation, and the extent to which we are upholding this definition. The definition of the situation is the normative expectations for how interaction should proceed in a given setting between people with certain identities engaging in certain activities. For example, being a student in a classroom surrounded by other students defines the situation as requiring certain behaviors (e.g., sitting forward, toward the teacher) and prohibiting other behaviors (e.g., talking loudly). Violating this definition—not satisfying expectations—can elicit a range of formal and informal sanctions that may call into question the violator’s role in the situation. This is to say that a distracting student can quickly lose an identity as an attentive student, assuming they previously held this identity, and this risk motivates the

student to behave as expected. Put more generally, symbolic interactionists believe people are motivated to maintain the definition of the situation—to follow the expectations of the situation—in order to maintain self-perceptions and a consistent view of the world (Cooley 1983; Mead 1934).

Affect Control Theory (ACT) is a sociological theory that builds off SI to explain how we react when situational expectations are not supported (Heise 1987). To do so, ACT argues that people interpret the world along three dimensions of social meaning: evaluation (good vs bad), potency (strong vs weak), and activity (lively vs calm) (EPA). Through socialization, people come to associate identities, settings, and behaviors with these three affective meanings. ACT's central proposition is that people desire for the "transient impressions" of any given situation we encounter—our sense of how good, strong, and lively a person, location, or action is that we are currently experiencing—to match our cultural expectations (referred to as "fundamental sentiments") for the situation. When our transient impressions fail to align with our sentiments, people experience deflection, a psychological discomfort people are motivated to resolve. For example, learning that a mother was caught shoplifting should generate some deflection because mother is generally considered a positive identity (positive evaluation) while shoplifting is viewed negatively (negative evaluation). This would likely inspire an individual to seek further information to explain this discrepancy. The uneasiness experienced while observing this situation—the defection—should be resolved after discovering the mother had a litany of previous convictions. This would lead to assigning an additional identity to the mother: criminal (negative evaluation). The deflection is now

resolved because there is nothing unusual about a criminal engaging in crime, even if she is also a mother.

A key tenet of ACT is that identities have socially derived expectations for behavior. Violating these expectations produces an uneasiness—deflection—that is experienced as emotion and motivates a change that resolves the deflection. The expectations associated with identities are not unchanging but instead vary depending on behavior and setting, and these expectations can include the expectation for social engagement. More specifically, there are activities (a form of behavior), times of the day and week, and locations (both of which are a form of setting) that vary in expected sociality. I propose that deviating from these expectations by being isolated during normatively social activities, in normatively social locations, and during normatively social times is the kind of event that will produce a sense of deflection. Further, I propose that state loneliness is an emotion that functions as a signal indicating an individual is experiencing deflection produced by being abnormally asocial. This conceptualization of state loneliness fits with the broader definition typically ascribed to loneliness as being an "aversive affective state" that "reflects a perceived and undesired social isolation" (van Winkel et al. 2017). Further, just as emotion more broadly is envisioned as the mechanism driving people to change some aspect of their situation to resolve deflection (Heise 1987), loneliness is envisioned as a mechanism evolved to elicit behaviors that will increase sociality (Cacioppo et al. 2011).

State Loneliness as an Indicator of Deflection

Conceiving of loneliness as emotion (and therefore as a signal of deflection) leads to a novel prediction currently absent from literature on social isolation. As discussed earlier

in this proposal, loneliness is generally considered to originate from an unmet desire for social interaction. Research has only recently assessed how this desire can change on a situational level through perceptions of meaningfulness (Tam and Chan 2019). ACT instead conceives of desire partly as a function of situational expectations. People do not merely desire social interaction to the same extent at all times. They may desire it at different times, in different locations, and during different activities. A person likely desires companionship when he or she goes out for dinner and desires significantly less companionship brushing his or her teeth in the morning. In both cases, ACT would articulate this difference in desire as originating in socially derived expectations for social behavior. Put more broadly, expectations should play a pivotal role in shaping desire for social interaction in any given situation, and therefore the extent of state loneliness if social behavior is normatively expected but unfulfilled. This leads directly to the following hypothesis:

> **Hypothesis:** Situational expectations for social behavior moderate the effect of social isolation on state loneliness—being alone will lead to stronger feelings of loneliness in normatively social situations relative to being alone in non-normatively social situations.

Differences Across Samples

In this chapter, I test my hypothesis with both graduate student participants and online crowdsourced participants. In ACT, expectations are derived from the broader culture (Heise 1987), and this indicates that disparate groups of people who share the same broader culture (such as U.S. grad students and U.S. online workers) should respond similarly to isolation experienced at similar times, during similar activities, and in similar

locations. Yet, given the lack of research in the area of state loneliness (van Roekel et al. 2018), I choose to analyze these samples separately. This approach is valuable because the relationship between isolation and loneliness may be impacted by processes outside of ACT theorizing which may potentially complicate analyses for one group but not the other, for reasons particular to the group. Due to a lack of research in this area, I do not offer formal hypotheses regarding how graduate students and online workers will differ, or if they will differ, but instead conduct parallel analyses of both groups and note consistencies and inconsistencies between these groups.

Methods

Data

To test my hypotheses, I use four samples. The first two samples measure situational expectations, which identify the times, activities, and locations in which people are expected to be with others. The first expectations sample consists of 50 graduate students recruited on Amazon's Mechanical Turk (MTurk) (46% women, M_{age} = 30.02, SD_{age} = 6.82) and the second expectations sample consists of a broader sample of 50 participants recruited from Prolific Academic (66% women, M_{age} = 31.44, SD_{age} = 10.03).

The second two samples consist of time-use data that allow me to see how the association between isolation and loneliness varies by expectations to be with others. The first time-diary sample consists of 1,876 24-hour retrospective time diaries collected from 627 graduate students at a large public Mid-Atlantic university. I refer to this as the Grad sample. The second time-diary sample consists of 800 time diaries collected from 310 participants recruited from MTurk and Prolific Academic. I refer to this as the MT/PA

sample. Table 2.1 includes descriptive statistics for both time-diary samples as well as the measures of interest, described in the next section.

Table 2.1. Descriptive Statistics for Key Variables for Grad and MT/PA Samples

Variable		**Mean/Proportion (SD)**	
		Grad	MT/PA
Dependent Variable			
	Loneliness	1.68 (1.27)	1.56 (1.21)
Situational Variables			
	Isolation	.63	.58
	Social Times	.08	.25
	Social Activities	.11	.12
	Social Locations	.29	.13
Demographic Variables			
	White	.57	.76
	Latinx	.05	.03
	Black	.04	.07
	Asian	.26	.06
	Other Race	.02	.02
	Multiracial	.07	.07
	Man (ref. category)	.34	.41
	Woman	.66	.59
	Sexual Minority (ref. category)	.21	.15
	Heterosexual	.79	.85
	Age	27.35 (4.77)	39.09 (12.37)
$N_{\text{level 1}}$		627	310
$N_{\text{level 2}}$		20,826	7,657

To complete a time diary, participants were asked to report on every activity they engaged in between midnight and 11:59PM on a given day. These activities are matched to pre-coded activities used in the American Time Use Survey (U.S. Bureau of Labor Statistics and U.S. Census Bureau 2016). If the participants entered an activity that could not be matched to an existing category, they were asked to categorize the activity into

existing codes to the best of their abilities. I recoded 4.31% of the Grad sample and 2.45% of the MT/PA sample to better match the ATUS coding scheme. I discuss these codes and other measures collected during the time diary further in the next section.

Measures

Expectations Survey

Social Expectations. To determine norms for social behavior, participants in the two expectations samples responded to questions asking the extent to which they "…would feel pressured to be around and engage with others they know out of a desire to not be viewed as a loner, outcast, or overly solitary" during the activities and in the locations reported in Table 2.1. Further, participants responded to these questions in regard to each day of the week, and each major time period within each day—morning, afternoon, evening, and night. Participants in the graduate student expectations sample were asked this question in regard to graduate students, while the broader expectations sample were instead asked to answer this question in regard to "most people". Response categories included "Strongly Disagree", "Disagree", "Somewhat Disagree", "Somewhat Agree", "Agree", and "Strongly Agree".

If a time, activity, or location reached or exceeded an average value of "Somewhat Agree" (i.e., a 4 on the 1 to 6 scale), I categorize the time, activity, or location as normatively social. Otherwise, I categorize the time, activity, or location as not normatively social. Social expectations are simple to merge into the time-diary datasets for activity and location—since each case in the time-diary data has only one associated activity and location—but the merging process is more complex for time. An activity will often span multiple times of the day, and these time periods may vary in

social expectations. To identify social expectations for time, the 1 to 6 score for a case is the average of each time period (morning, afternoon, evening, and night) spanned by the case, with the weight of each time period on this score being proportional to the amount of time spent in the time period. As with activity and location, if the final value of this 1 to 6 scale meets or exceeds a 4 ("Somewhat Agree"), then the time is categorized as normatively social. I merge social expectations scores reported by the graduate student expectations sample into the Grad time-diary sample, and I merge expectations from the broader expectations into the MT/PA time-diary sample.

Time Diary

Loneliness. The dependent variable is a momentary assessment of perceived loneliness (i.e., state loneliness). I asked participants "How lonely did you feel during this time?" with response categories ranging from 1 "Not at all" to 7 "Very much." As shown in Table 2.1, the mean level of loneliness experienced in both the Grad and MT/PA sample is relatively low, at about 1.68 and 1.56, respectively, on the 1 to 7 scale.

Isolation. Participants in both time-diary samples were asked two questions designed to gauge with whom they are interacting during an activity. The first question asked, "who participated in this activity with you?" and the second question asked, "who else was present?" Response options for both questions are spouse/partner, own child/children, other family member(s), co-worker/colleague(s), friend(s), other non-family member(s), pet(s), and no one. The isolation variable combines instances in which one is completely alone and instances in which one is around others but not engaged in a shared activity (passive engagement). Engaging with others in a shared activity (active engagement) is the reference group. I construct a binary variable because active

engagement has a significantly stronger negative association with loneliness than does passive engagement (see ch.3), and combining passive engagement with no engagement allows for the analysis of activity and location categories that are highly unlikely to feature a complete lack of others (e.g., social locations, such as restaurants).

Time, Activity, and Location. A time diary is constructed of multiple moments, with each such moment oriented around a central activity, which starts at a specific time and ends at a specific time and is conducted in a specific location. In the Grad sample, these activity categories include personal care, eating, travel, work, meetings / in class, coursework / research, housework / carework, leisure / exercise, socializing / events, and other activities. In the MT/PA sample, these activity categories include personal care, eating, travel, employee work, gig work, housework / carework, leisure / exercise, socializing / events, and other activities. The main differences pertain to work and school. The Grad dataset focuses on activities relevant to the lives of graduate students, such as meetings / in class and coursework / research. The MT/PA coding scheme focuses on the distinction between paid employment and gig work. The coding schemes are otherwise identical between the two samples. Personal care includes activities like sleeping, showering, and getting ready. Due to the personal nature of these activities, I do not ask follow-up questions about them. As such, personal care is excluded from the analyses. I also do not include other activities, due to an inability to identify these activities as normatively social or non-social. Lastly, both the Grad and MT/PA samples used the same location categories to indicate where participants were during an activity. These options include home, work, school, someone else's home, restaurant or bar, traveling somewhere, outdoors (not traveling), store or mall, place of worship, gym/health club, or

some other place. As with activities, I do not include the other place location, due to an inability to identify this location as normatively social or non-social

Sense of Connectedness and Sense of Control. When with or in the presence of others, participants in the MT/PA sample answered a question asking "In general, how close and connected did you feel to those around you during this activity?" as well as a question asking "To what extent was it your choice to be around others (as opposed to being alone) during this activity?". Participants responded to these questions on a 1 to 7 scale, where 7 refers to a greater sense of connection / control. I refer to these as measures as connectedness and control, respectively. I do not include these as control variables in the main analysis because these measures lack data from activities done in isolation. I instead rely on these measures for follow-up analyses.

Analytic Strategy

The analyses proceed in three stages. The first identifies which times, activities, and locations are deemed as normatively social among the graduate student sample and the broader sample. Next, I assess the main hypothesis by seeing if normatively social times, activities, and locations associate with higher rates of loneliness when experienced alone, relative to being alone during non-normatively social times, activities, and locations. I conduct these analyses by interacting isolation with normative expectations, with separate models for time, activity, and location for both samples, resulting in six models in total. The final stage provides a follow-up analysis that provides further context for unexpected findings. All time-diary using analyses use random-intercept models to account for the clustering of activities within participants. These analyses also include controls for race, gender, sexuality and age.

Results

Social Expectations

Table 2.2. Percent of activity, location, and time in Grad and MT/PA Samples

		Grad	MT/PA
Activity			
	Leisure / Exercise	17.52	23.46
	Travel	17	14.58
	Housework / Carework	15.42	22.52
	Eating	14.22	17.09
	Coursework / Research	12.85	—
	Work	10.36	—
	Paid Employment	—	**7.64**
	Gig Work	—	**7.3**
	Socializing / Events	**6.59**	**4.19**
	Meetings / In class	**4.17**	—
Location			
	Home	47	65.9
	Other (social)	**20.44**	**5.9**
	Travel	16.30	14.07
	Work	**8.11**	**6.79**
	Other (non-social)	6.28	4.78
Time			
	Non-social	92.06	75.22
	Social	**7.94**	**24.78**

This table shows the percent of each activity, location, and time of the day featured in both the Grad and MT/PA datasets. For example, 47% of activities are spent at home in the Grad sample vs. 65.9% in the MT/PA sample. Missing values indicate that the activity is not relevant to the sample or is captured by a different activity. For example, the MT/PA sample does not include the "Coursework / Research" activity because this activity does not appear often enough to analyze in this sample. "Work" is also missing from the MT/PA dataset because this activity is instead captured by "Paid Employment" and "Gig Work." The activities, locations, and times identified as normatively social are highlighted in bold.

Table 2.2 includes both the percent representation of each activity, location, and time in both datasets, as well as which activities and locations qualify as normatively social for each dataset. Both expectations samples were largely consistent regarding which times, activities, and locations were normatively social. For times, both samples identified Friday evening, Friday night, and Saturday evening as normatively social. Further, unlike the graduate sample, the broader sample also identified Saturday afternoon and night as

normatively social. Consistently coding Saturday afternoon and night as normatively social or not normatively social in both the Grad and MT/PA samples produces consistent results in the next section's analyses.

For activities, Table 2.2 shows that normatively social activities are predominately work related or involve socializing. Although I categorize both "paid employment" and "gig work" as social, MT/PA participants only evaluated "work" as a broad category. It is possible that if asked to evaluate these categories separately participants would have viewed gig work as more solitary, however I leave gig work as normatively social because either categorization does not affect conclusions in the next section's analyses.

For locations, the only difference between these samples pertains to place of worship, which is normatively social for the broader sample and not normatively social for the graduate sample. Therefore, place of worship is part of the "Other (non-social)" location in the Grad sample and part of the "Other (social)" location in the MT/PA sample. Alternative approaches that consistently code place of worship in either category produce consistent findings in the next section's analyses, likely due to the rarity of this location in either time-diary sample. Beyond this, "Other (social)" includes school, restaurants or bars, and someone else's home in both samples, and "Other (non-social)" includes outdoors (not traveling), stores or malls, and gym/health clubs in both samples.

Main Analysis

Table 2.3. Random Intercept Regression Results for Loneliness on Isolation by Normative Sociality (Model 1, 3, 5: N_{level1} = 20,826; N_{level2} = 627) (Model 2, 4, 6: N_{level1} = 7,657; N_{level2} = 310)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Isolation	.457***	.236***	.485***	.257***	.511***	.271***
	(.015)	(.022)	(.016)	(.021)	(.017)	(.022)
Social Times	-.015	-.053†	—	—	—	—
	(.035)	(.031)				
Isolation x Social Times	.114*	.09*	—	—	—	—
	(.048)	(.041)				
Social Activities	—	—	.05*	.012	—	—
			(.024)	(.045)		
Isolation x Social Activities	—	—	-.379***	.026	—	—
			(.08)	(.057)		
Social Locations	—	—	—	—	.066 **	.049
					(.023)	(.022)
Isolation x Social Locations	—	—	—	—	-.144***	-.075
					(.03)	(.061)
Latinx	.435*	.231	.441*	.225	.4*	.234
	(.181)	(.314)	(.182)	(.315)	(.181)	(.317)
Black	-.095	-.042	-.09	-.03	-.096	-.028
	(.195)	(.221)	(.195)	(.221)	(.194)	(.223)
Asian	.299**	.201	.301**	.202	.307 **	.205
	(.09)	(.264)	(.09)	(.264)	(.09)	(.266)
Other Race	-.078	.435	-.08	.475	-.082	.431
	(.252)	(.385)	(.252)	(.385)	(.251)	(.389)
Multiracial	.155	-.054	.158	-.064	.17	-.063
	(.148)	(.217)	(.148)	(.217)	(.147)	(.219)
Woman	-.06	-.096	-.06	-.096	-.067	-.097
	(.08)	(.119)	(.08)	(.119)	(.08)	(.12)
Heterosexual	-.096	.14	-.092	.144	-.084	.128
	(.092)	(.166)	(.092)	(.166)	(.092)	(.167)
Age	-.01	-.017**	-.01	-.017**	-.01	-.017**
	(.008)	(.005)	(.008)	(.005)	(.008)	(.168)
Constant	1.778***	2.08***	1.75***	2.06***	1.73***	2.08***
	(.238)	(.241)	(.238)	(.242)	(.238)	(.244)

Models show how factors associate with loneliness, net of other factors in the model. Models 1, 3, and 5 assess the Grad dataset. Models 2, 4 and 6 assess the MT/PA dataset. Note: Standard errors are in parentheses. A level 2 random intercept for participant is included to account for clustering. † p < .1, * p < .05, ** p < .01, *** p < .001, two-tailed tests.

Table 2.3 includes results from six random intercept regressions examining if social isolation influences loneliness differently depending on sociality expectations associated with time (model 1 and 2), activities (model 3 and 4), and locations (model 5 and 6). I separately analyze the Grad (model 1, 3, and 5) and MT/PA (model 2, 4, and 6) samples. Overall, as expected, the interaction between isolation and time is significant and positive for the Grad sample ($b = .114$, $p < .05$) and the MT/PA sample ($b = .109$, $p < .05$), while activity and location do not appear as expected in either sample. Among the Grad sample, activity and location produce reverse from expected findings, with the interaction of isolation with normatively social activities and the interaction of isolation with normatively social locations associating with lower levels of loneliness ($b = -.379$, $p < .001$ and $b = -.144$, $p < .001$, respectively). This means that in the Grad sample, participants tended to be less lonely while isolated during normatively social activities and in normatively social locations. For the MT/PA sample, the interaction between isolation and activity and the interaction between isolation and location are not statistically significant ($b = .026$, *n.s.* and $b = -.075$, *n.s.*). No findings in this section are notably changed by the inclusion or exclusion of the demographic controls.

Follow-up Analyses

Activity

Activity did not operate as expected in either the Grad or MT/PA samples. To better understand why this might be, I examine the extent of loneliness while alone and with others during each activity in Figure 2.1 and 2.2. These analyses are complicated by some activities almost always being done with others (i.e., meetings / in class in the Grad sample and socializing / events for both samples) or alone (i.e., gig work in the MT/PA

sample). I exclude these activities in the following analyses due to this lack of variation in social engagement.

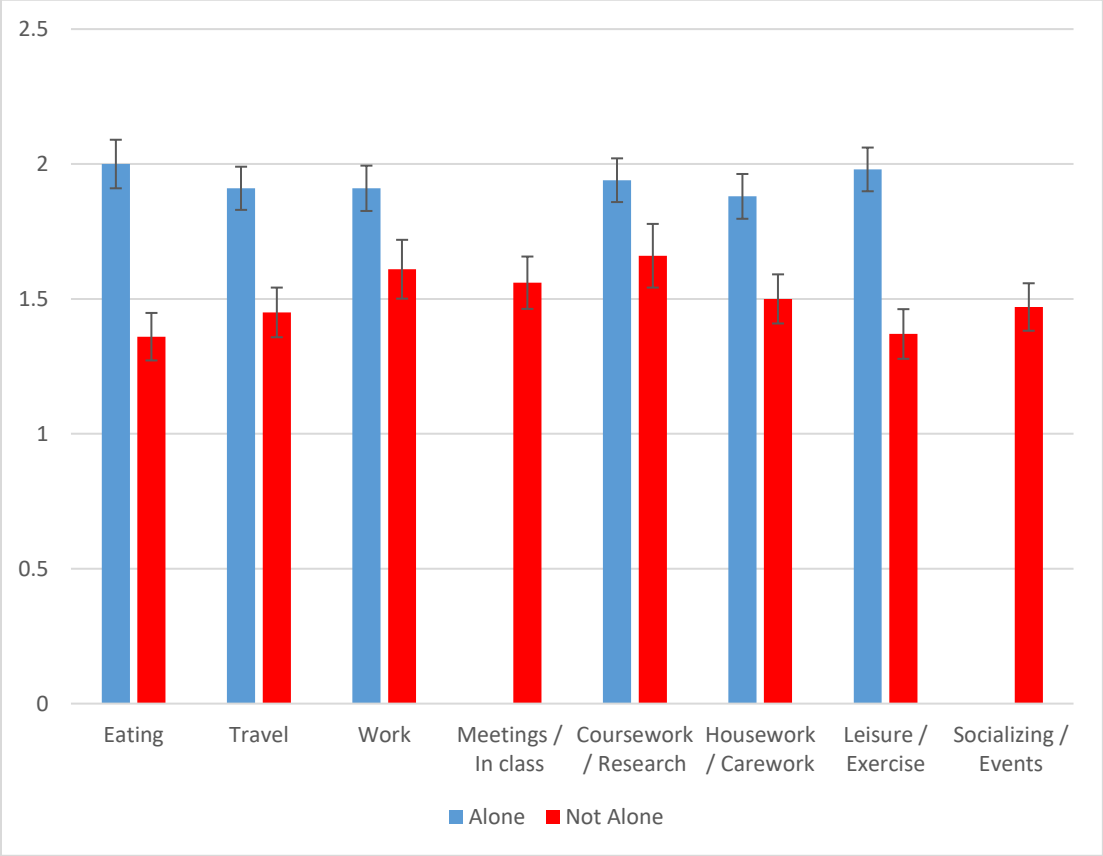


Figure 2.1. Predicted Loneliness by Activity and Isolation for Grad Sample

Note: Predicted values adjust for race, gender, sexuality, and age. Larger values along the y-axis indicate stronger feelings of loneliness during each activity reported on the x-axis. Loneliness experienced while alone during "Meetings / In class" and "Socializing / Events" are not reported due to there being too few cases to analyze.

For the Grad sample, Figure 2.1 shows how loneliness varies by activity. Eating shows the greatest benefit from the presence of others ($\Delta = .638$, $p < .001$), while work shows the least benefit from being with others ($\Delta = .298$, $p < .001$). The delta (i.e., increase in loneliness when isolated, relative to being with others) for eating is

significantly greater than the delta for travel ($p < .001$), work ($p < .001$), coursework / research ($p < .001$), and housework / carework ($p < .001$), but not leisure / exercise. The delta for work is significantly smaller than the delta for leisure / exercise ($p < .001$), travel ($p < .01$), and not significantly different from housework / carework or coursework / research. Overall, participants benefitted most from the presence of others while eating and during leisure / exercise, and they benefitted the least during work, research / coursework, and housework / carework.

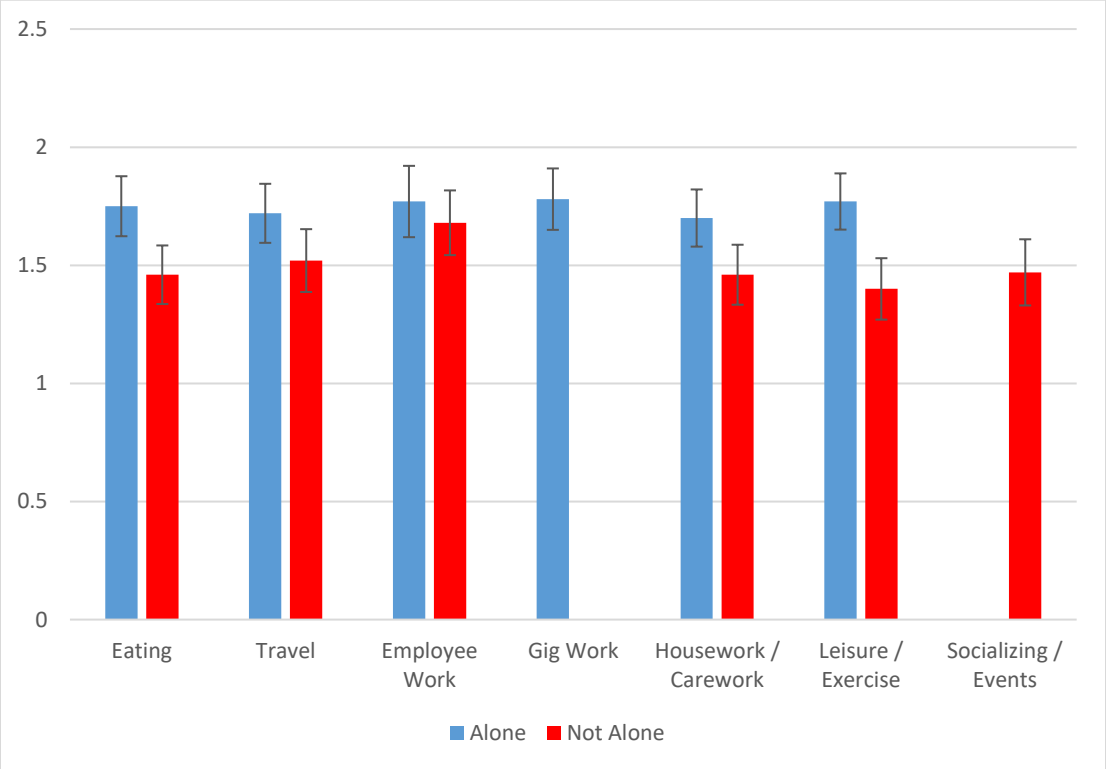


Figure 2.2. Predicted Loneliness by Activity and Isolation for MT/PA Sample

Note: Predicted values adjust for race, gender, sexuality, and age. Larger values along the y-axis indicate stronger feelings of loneliness during each activity reported on the x-axis. Loneliness experienced while with others during "Gig Work" and alone while "Socializing / Events" are not reported due to there being too few cases to analyze.

For the MT/PA sample, Figure 2.2 shows the greatest benefit to being with others during leisure / exercise ($\Delta = .377$, $p < .001$) and the least benefit during employee work ($\Delta = .091$, *n.s.*). The delta for leisure / exercise is significantly larger than it is for travel ($p < .01$), employee work ($p < .001$), and housework / carework ($p < .05$), but not eating. The delta for employee work is significantly smaller than the deltas for eating ($p < .01$) and housework ($p < .05$) but not travel. Overall, MT/PA participants benefitted most from the presence of others during leisure / exercise and eating, and they benefitted the least during employee work and travel.

Both the Grad and MT/PA samples tell a consistent story regarding the benefit of being with others by activity, with eating and leisure / exercise benefiting the most from the presence of others and work (in various forms) benefitting the least. The findings for leisure / exercise may partially related to changes in the kind of leisure / exercise people do with others and alone. For example, across both samples, leisure / exercise done alone tends to more often involve social media and less often involve exercise / sports. However, the delta change for leisure / exercise remains among the largest observed in both samples even after removing social media and exercise / sports from the category ($\Delta = .662$, $p < .001$ for Grad, $\Delta = .411$, $p < .01$ for MT/PA).

Lastly, work benefitted the least from the presence of others. This may relate to the nature of participants' relationships with others at work. The MT/PA sample allows for a close examination of this possibility, and results show that participants report the lowest levels of closeness with others relative to any other activity category, as well as the lowest sense of control over whether or not they were social in this setting.

Location

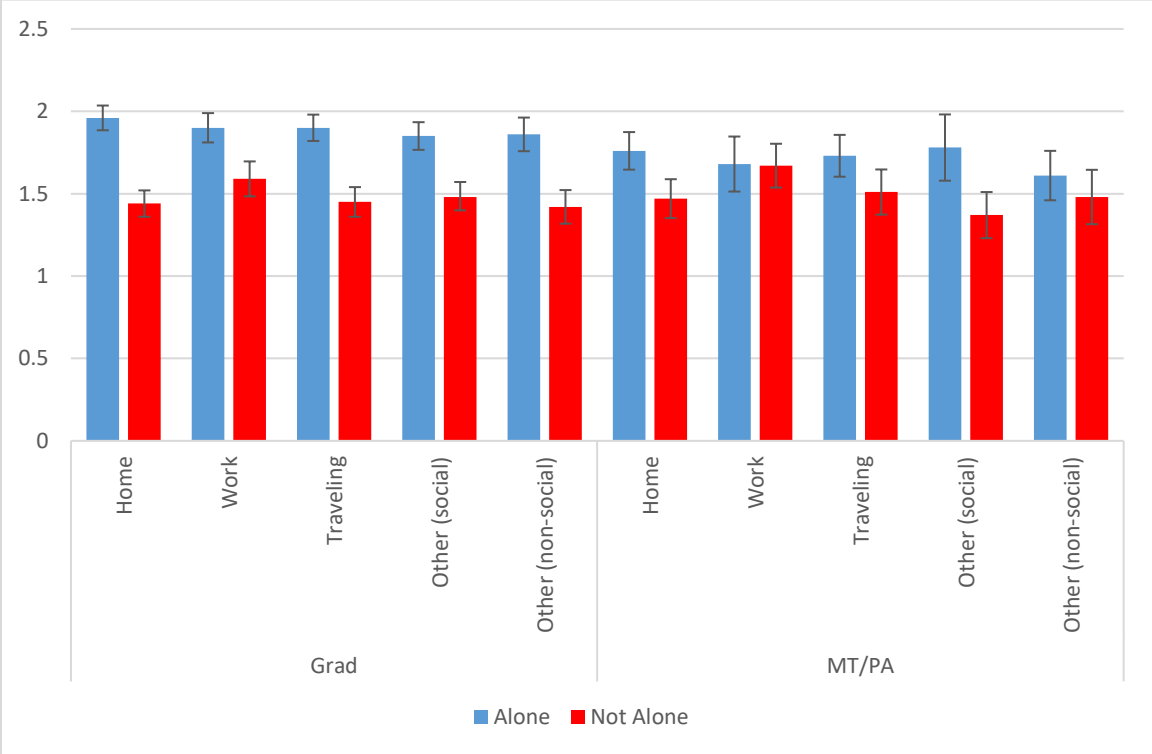


Figure 2.3. Predicted Loneliness by Location and Isolation for Grad and MT/PA Sample

Note: Predicted values adjust for race, gender, sexuality, and age. Larger values along the y-axis indicate stronger feelings of loneliness while in each location reported on the x-axis.

Like activity, location did not operate as expected in either the Grad or MT/PA samples. To better understand why this might be, I examine the extent of loneliness while alone and with others in each location. Figure 2.3 shows how loneliness varies by location in both the Grad and MT/PA samples. For the Grad sample, the benefit of being with others is largely consistent across all locations, but with home showing the greatest change (Δ = .532, $p < .001$) and work showing the least change (Δ = .313, $p < .001$) between being with others and being isolated. The benefit of being with others while at home is significantly greater than work ($p < .001$) and being in other social locations ($p < .001$),

marginally greater than traveling ($p < .1$) and other non-social locations ($p < .1$). The benefit of being with others while at work is significantly lower than traveling ($p < .05$), marginally lower than other non-social locations ($p < .1$), and not significantly different from other social locations. Overall, participants benefitted most from the presence of others while at home, and they benefitted the least from the presence of others while at work and while in other social locations.

For the MT/PA, Figure 2.3 shows that the benefit of being with others varied more in this sample relative to the Grad sample. Participants again reported the least benefit to being with others while at work ($\Delta = .009$, *n.s.*), and this change is significantly less than the change observed among home ($p < .001$), travel ($p < .05$), other social locations ($p < .001$), but not other non-social locations. Being with others while in the other social locations category shows the largest change ($\Delta = .416$, $p < .001$), which is significantly more than work ($p < .001$), other non-social locations ($p < .05$), travel ($p < .05$), and not significantly larger than home. Overall, participants in the MT/PA sample benefitted the most from being with others while in other social locations and home, and they benefit the least while at work and other non-social locations.

Both the Grad and MT/PA samples tell a largely consistent story regarding loneliness at work and at home, albeit not the story I anticipated. Both samples show home offers among the most benefit to being with others, while participants benefitted the least while at work. Other social locations and other non-social locations are the most inconsistent between these samples. I anticipated that the difference in loneliness would be greater in other social locations, therefore my expectations align with the findings from the MT/PA sample. One possible issue is that the Grad sample consists of a

significantly higher proportion of activities located at school (70.79% of all cases in the other social locations category in the Grad dataset, relative to 30.15% in the MT/PA dataset). However, separating school from other social locations does not alter findings. Another possible issue may be that places of worship are categorized in the other social locations category for MT/PA and other non-social locations for Grad. However, perhaps due to the low instances of this location in both datasets, categorizing place of worship consistently in other social locations or other non-social locations does not affect findings.

Home was the most frequently reported location in both the Grad and MT/PA sample, as well as one of the locations where participants benefited the most from the presence of others. This may be partly related to the nature and timing of activities occurring in this location. When participants ate alone or engaged in the leisure / exercise alone, they were more likely to be at home than in any other location (in the Grad sample, 74.79% of all eating done alone and 77.44% of all leisure / exercise done alone occurs at home, and in the MT/PA sample, 84.59% of all eating done alone and 92.26% of all leisure / exercise is done alone occurs at home). Home is also where most people are when isolated during normatively social times (67.25% of cases for Grad, 80% of cases for MT/PA). Therefore, in both samples, participants were most likely to be at home when isolated during the times and activities in which participants suffered most acutely from isolation, relative to being with others. However, participants continue to benefit the most from the presence of others while at home relative to most other locations even after including controls for location and whether or not the time is normatively social.

Lastly, as with work as an activity, participants benefitted the least from the presence of others while at work. Further analyses in the MT/PA samples again show that, consistent with work as an activity, work as a location associated with the lowest levels of closeness and control over social engagement relative to all other locations in the MT/PA sample.

Discussion

This study included a sample of time-use data collected from graduate students and online participants recruited from MTurk and Prolific Academic (referred to as the Grad and MT/PA samples, respectively). Separate samples of participants evaluated times, activities, and locations as normatively social or not normatively social. Merging these evaluations with the Grad and MT/PA samples allowed me to test my hypothesis that social isolation would lead to more severe feelings of loneliness during normatively social times, activities, and in normatively social locations, relative to social isolation in non-normatively social times, activities, and locations. Social expectations worked as anticipated for time but not activity or location.

Normatively social activities and locations were not typically the activities and locations where social isolation associated with the greatest increase in loneliness. Work stands out as the clearest example. Work as an activity was evaluated as normatively social in the MT/PA sample but not in the Grad sample, though work as a location was normatively social in both samples. Yet, whether examining work in either sample or as an activity or location, being with others was consistently among the least beneficial while working or at work relative to all other activities and locations. Follow-up analyses in the MT/PA sample offer some clues as to why. Participants reported feeling the least

connected to others while working / at work. This indicates that the presence of others may not be useful for avoiding loneliness due a lack of tie strength with others in such settings, relative to being with others in non-work settings. Beyond this, participants also reported having the least control over whether or not they were around others while working / at work. This may indicate that work was coded as normatively social for reasons outside of those intended by the measure. The pressure to be social may reflect a requirement for maintaining the job and not due being viewed as a loner.

While some activities/locations coded as normatively social exhibited the least benefit from the presence of others, other activities and locations that were not coded as normatively social were associated with the greatest increase in loneliness when experienced alone. Across both samples, this included eating, leisure / exercise, and time spent at home. For eating, this activity may have been more appropriately coded as normatively social. When coders assessed eating, they coded eating in general but not different kinds of eating, such as the distinction between traditional meals (breakfast, lunch, and dinner) and snacking. Yet, when completing the time diary, it is conceivable that participants did not report snacking as a primary activity but instead predominately reported traditional meals, which may have been deemed as normatively social if coders had been asked about traditional meals specifically. Next, the increased loneliness experienced when engaging in leisure / exercise alone may be related to changes in the form of leisure / exercise people engage in alone vs. with others, yet follow-up analyses found that the increase in social media or a reduction in exercise / sports while isolated did not affect findings. These results suggest that research focusing on the benefits of active leisure (e.g. exercise) over passive leisure (e.g. watching television) for wellbeing

should also focus on the benefits of leisure done with others over leisure done alone (Wiese, Kuykendall, and Tay 2018). Lastly, home was the most common location reported by participants in both samples, as well as being among the locations that most benefitted from the presence of others. This may partly relate to what people do at home. Engaging in leisure / exercise and eating associate with the largest increase in loneliness when done alone, and both are done alone most frequently while at home relative to all other locations. Similarly, participants were most likely to be at home when isolated during normatively social times. Yet, even after adjusting for activity and time, the home still associated with the greatest increase in loneliness when in isolation. Given the significance of the home in people's lives, future research would benefit from further exploring its association with loneliness.

The unexpected findings among activities and locations may relate to a need to further refine the measurement of social expectation (i.e., eating and work) and/or particular facets of the activity or location (i.e., work). Although findings for activity and location largely do not align with expectations, this chapter advances our understanding of social isolation and loneliness in several ways. First, the findings in regard to time are consistent with this chapter's central hypothesis—loneliness is more likely to result from isolation during times when people are normatively expected to be social (i.e., later in the day during Fridays and Saturdays) relative to other times of the week. Second, although activity and location did not associate with isolation and loneliness as expected, findings are largely consistent across both the Grad and MT/PA samples. These findings may be fruitful for future research seeking to better understand the conditions under which isolation leads to loneliness. These findings may also be useful for future social

interventions that seek to alleviate loneliness by highlighting the times, activities, and locations in which people should make the most effort to be with others.

Note: This chapter is a modified version of a paper that is under review.[2]

Chapter 3: Tie Strength and Form of Engagement

Loneliness, the subjective perception of social isolation, has been found to be severely detrimental to mental and physical health (Cacioppo et al. 2011; Cacioppo and Cacioppo 2014). It is thought to arise from a mismatch between desired and experienced social engagement (Peplau et al. 1982), and research often seeks to understand the origins of this mismatch by focusing on a lack of engagement with satisfying, strong-tie connections, such as friends, family, and romantic partners (Hawkley et al. 2008; Shiovitz-Ezra and Ayalon 2010). These two factors—engagement and tie-strength—are of central importance to the experience of loneliness, yet aspects of both remain unexplored in existing research. First, the value of weak ties (e.g., coworkers while at work, classmates while in school) remains largely overshadowed by the current focus on strong ties. This is despite weak ties often being more available in people's daily lives than are strong ties, and therefore weak ties may be instrumental for combating loneliness. Second, research assessing the momentary experience of loneliness (van Roekel et al. 2015, 2018; Tam and Chan 2019; van Winkel et al. 2017) conceive of social engagement as a binary: either others are present in a situation or absent. However, others can be present in different ways that may have important implications for how loneliness is experienced. For example, in this chapter, I focus on the difference between shared engagement in an activity (which I call *active engagement*) and more passive forms of engagement, such as mere co-presence (which I call *passive engagement*). Although tie

[2] R. Gordon Rinderknecht, Long Doan, and Liana C. Sayer. "Loneliness Loves Company, Some More Than Others: Tie Strength, Form of Engagement, and Their Interactive Relation to Loneliness." Under review at *Social Problems*.

strength and form of engagement may seem conceptually distinct in their relationship with loneliness, I anticipate that both relate to feelings of closeness and connection. Due to this shared mechanism, I anticipate that both factors will have an interactive relationship with loneliness.

To understand this interaction between tie strength and form of engagement, imagine occupying the same space as a friend versus occupying the same space as a coworker or colleague. The mere co-presence of an intimate tie may be beneficial for avoiding loneliness, whereas less-intimate co-present ties may not enter people's attention and therefore provide little benefit. At the same time, the difference in experienced loneliness may be similarly low when actively engaged with either strong or weak ties. This means that engagement with strong ties may be beneficial regardless of how they are interacted with, but engagement with weak ties may require active engagement to benefit wellbeing.

In the sections that follow, I first discuss the main effect tie-strength and form of engagement are likely to have on loneliness. Next, I propose how tie strength and form of engagement may have an interactive effect on loneliness. I then test these expectations with original time-use data collected from 627 graduate students.

Tie Strength

Strong ties are often a source of social and emotional support (Granovetter 1983), and weak ties serve important roles in introducing local networks to new knowledge (Aral 2016; Levin and Cross 2004) but are typically seen as a relatively less useful source of emotional support and wellbeing (Thoits 2011; Wellman and Wortley 1990). Consistent with these conclusions, loneliness research finds the presence of weak ties (e.g.,

roommates, classmates) to be less beneficial for avoiding loneliness relative to the presence of strong ties (e.g., friends, family) in early and late adolescent samples (van Roekel et al. 2015, 2018).[3] Although rates of loneliness may be higher among young people (Qualter et al. 2015), I anticipate similar results in my adult sample.

Hypothesis 1: The presence of stronger ties will associate with lower levels of loneliness than will the presence of weaker ties.

Form of Engagement

Loneliness research predominately focuses on estimating rates of social engagement rather than forms of social engagement, and these rates are typically estimated by measuring engagement over a broad or unspecified timescale, or by inferring typical rates of engagement from a count of participants' friends, confidants, or the presence of a spouse (Hua Wang and Wellman 2010; McPherson et al. 2006; Zavaleta, Samuel, and Mills 2017). *How* people interact with others may be perceived to be too challenging or inconsequential by researchers to capture via such measures. Studies employing experience sampling methodology (Pejovic et al. 2015) and day-reconstruction methodology (Kahneman et al. 2004) are better suited for capturing such details due to measuring experiences as they occur or near to their occurrence, yet these studies have also not explored how different forms of engagement associate with the experience of

[3] I identify interaction partners as strong or weak ties consistent with past research on momentary experiences by identifying spouses/partners, family, and friends as strong ties and other non-family individuals as weak ties. Additionally, I analyze spouses/partners, family, and friends separately due to the unique nature of my sample potentially resulting in some strong ties being stronger than others. Lastly, I did not request participants report the presence of strangers in this study.

loneliness. For example, when measuring a particular moment in time, this research typically asks participants "whether they were alone" (Tam and Chan 2019), "alone or with others" (van Roekel et al. 2015, 2018), or "with anyone else…" (Queen et al. 2014) during particular activities. The American Time Use Survey (ATUS) also assesses social interaction in this manner (Cornwell 2011; Marcum 2013). These questions capture the presence of others but do not distinguish between different forms of engagement. To assess the importance of evaluating engagement form, I conceive of social engagement in two ways: 1) joint-engagement in an activity (referred to as *active engagement*) and 2) mere co-presence (referred to as *passive engagement*), which refers to others being present in a setting but without shared engagement in an activity. This translates into a variable with three levels: active engagement, passive engagement, and no engagement (i.e., social isolation).

Research on marital satisfaction finds greater feelings of marital support predict higher rates of active engagement with a partner (Flood, Genadek, and Moen 2018). To explain this finding, Flood et al. (2018) argue that choice of engagement may be a strategic decision in which spouses who feel less marital strain may choose to interact more directly with each other, while spouses who feel more marital strain may more often opt for passive engagement. Findings from Flood et al. (2018) may generalize to other relationships, in that the choice between active or passive engagement may reflect strategic decisions to approach (or avoid) individuals a person likes (or dislikes). This approach makes the most sense for others that a person may be required to be around, like coworkers, and indicates that reduced feelings of loneliness during active engagement relative to passive engagement may be due to the presence of someone with

whom a person wants to directly interact. Alternatively, active engagement itself may be beneficial for avoiding loneliness relative to passive engagement, given that people's wellbeing benefits from many examples of active engagement (Watson et al. 1992). This may be because active engagement could be a source closeness and connection, which has been identified as an important predictor of wellbeing (Reis et al. 2000).

Hypothesis 2: Active engagement will associate with lower levels of loneliness than will passive engagement or social isolation.

The Interaction Between Tie Strength and Form of Engagement

Although the presence of strong ties is generally more beneficial than the presence of weak ties for reducing loneliness (van Roekel et al. 2015, 2018), recent research demonstrates that engagement with weak ties benefits wellbeing (Sandstrom and Dunn 2014). However, it is currently unclear what situational factors vary the benefit of weak-tie engagement. I propose that form of engagement is one such factor that moderates the benefit of weak-tie engagement relative to strong-tie engagement, and I therefore expect that this factor will be crucial for understanding when the presence of weak ties will be the most beneficial.

Tie strength and engagement are similar in that both are related to feelings of closeness and connection. For example, relative to weak ties, strong ties are partly characterized by feelings of closeness and connection (Granovetter 1983; Thoits 2011). Further, active engagement is thought to be a source of closeness and connection (Reis et al. 2000), and some forms of active engagement can also engender similar feelings via perceptions of commitment and cohesion resulting from joint task completion (Lawler 2001). This shared focus on closeness and connection is relevant to the present chapter

due to the association between such feelings and individuals' sense of loneliness (Cacioppo et al. 2006). Therefore, both strong ties and active engagement are likely to lead to reduced levels of loneliness due to a similar mechanism: heightened feeling of closeness and connection. If feelings of closeness and connection are already present during active engagement, such redundancy may result in an interactive effect between tie strength and form of engagement. Specifically, if feelings of closeness and connection are a primary benefit of active engagement but already present for strong ties, then feelings of closeness and connection may be present during both active and passive engagement with strong ties. This may result in the presence of strong ties being similarly beneficial regardless of how they are engaged with. However, active engagement may be necessary to benefit from the presence of weak ties, due to the need to establish this sense of connection.

> **Hypothesis 3:** The effect of active engagement on loneliness is weaker for stronger ties than for weaker ties.

Methods

Data

To test my hypotheses, I use a sample of 627 graduate students at a large public Mid-Atlantic university. The data were part of a larger study on graduate student lives and mental wellbeing. I focus on the 1,876 24-hour retrospective time-diary data provided by respondents to examine how loneliness associates with tie strength, each form of social engagement, and the interrelation of these two variables. Table 3.1 includes descriptive statistics for the sample as well as my measures of interest, described in the next section.

As shown in the table, the sample is predominantly white (57 percent), women (66 percent), heterosexual (79 percent), and has a mean age of 27 years.

To complete the study, participants were asked to provide up to eight 24-hour retrospective time diaries where they report on every activity in which they are engaged beginning at midnight to 11:59PM on a given day. Participants were randomly assigned one weekday and one weekend diary at four time points during the fall 2018 semester. The mean number of diaries provided is 4.31 out of 8. Patterns of missingness suggest that participants are not systematically missing by day of week. Later rounds of data collection are more likely to yield missing data than earlier rounds (Chatzitheochari et al. 2018; Glorieux and Minnen 2009). Implications for this data limitation are discussed in the Discussion section.

These activities are matched to pre-coded activities used in the American Time Use Survey (U.S. Bureau of Labor Statistics and U.S. Census Bureau 2016). If the participant enters an activity that cannot be matched to an existing category, they are asked to categorize the activity into existing codes to the best of their abilities. I collapse these categories into eight primary activity categories: personal care, eating and drinking, traveling, working, housework and carework, leisure, media and social media, and other activities. Personal care includes activities like sleeping, showering, and getting ready. Due to the personal nature of these activities, I do not ask additional questions about the activity, including engagement, when respondents report these activities. As such, personal care is excluded from the analyses.

Table 3.1. Descriptive Statistics for Key Variables (N_{level1} = 21,245; N_{level2} = 627)

Variable	Mean/Proportion (SD)
Dependent Variable	
Loneliness (1–7)	1.68 (1.27)
Interaction Partner	
Alone (ref. category)	.49
Acquaintance	.18
Friend	.09
Family	.05
Spouse/Partner	.20
Form of Engagement	
Alone (ref. category)	.49
Passive Engagement	.15
Active Engagement	.37
Number of Interaction Partners	
One or No Partner (ref. category)	.91
Multiple Partners	.09
Race	
White (ref. category)	.57
Latinx	.05
Black	.04
Asian	.26
Other Race	.02
Multiracial	.07
Gender	
Man (ref. category)	.34
Woman	.66
Sexuality	
Heterosexual (ref. category)	.79
Sexual Minority	.21
Age (21–55 years)	27.35 (4.77)
Activities	
Eating/Drinking (ref. category)	.14
Traveling	.17
Working	.27
Housework/Carework	.15
Leisure	.12
Media	.12
Other Activities	.03
Day of Week	
Weekday (ref. category)	.57
Weekend	.43

Table 3.1 includes the relative proportion of the remaining activities, which indicates that as a proportion of reported activities participants engaged in roughly equal instances of eating and drinking (14 percent), traveling (17 percent), housework and carework (15 percent), leisure (12 percent), and media consumption (12 percent). Participants engaged in more instances of activities related to their work (27 percent) and fewer instances of other activities (3 percent), which included things like attending religious services and engagement with government services. For each of these activities, I asked participants to indicate who else was present, where they were located, emotions felt during the activity (including a momentary assessment of perceived loneliness), and when this activity started and ended, which I use to construct the primary variables described in the next section.

Measures

The dependent variable is a momentary assessment of perceived *loneliness*. I asked participants "How lonely did you feel during this time?" with response categories ranging from 1 "Not at all" to 7 "Very much." This question wording is consistent with the question wording used by past research assessing momentary loneliness (van Roekel et al. 2015, 2018; Tam and Chan 2019; van Winkel et al. 2017). As shown in Table 3.1, the mean level of loneliness experienced in this study is relatively low, at about 1.68 on the 1 to 7 scale.

Respondents were also asked two questions designed to gauge with whom they are interacting during an activity. The first question asked, "who participated in this activity with you?" and the second question asked, "who else was present?" Response options for both questions are spouse/partner(s), own child/children, other family

member(s), co-worker/colleague(s), friend(s), other non-family member(s), pet(s),[4] and no one. The latter question added "another" to the response option to reiterate that it is asking about a different person than the one who participated in the activity with the respondent.[5] Using these questions, I constructed the primary independent variables as follows.

Interaction partner combines the two association measures. Participants are sorted into categories based on the strength of ties with acquaintances (co-workers and other non-family) being the weakest ties, followed by friends, then family, and lastly spouses/partners being the strongest tie—and alone being the reference category.[6] I

[4] Although pet(s) is a response option, I exclude it from the analysis for two reasons. First, it is conceptually difficult to categorize non-human interaction partners as being a weak or strong tie. Second, most interactions with pets are also with human interaction partners. Interactions with only pets, while shown to be beneficial (Beck and Meyers 1996), are too sparse in this data to meaningfully examine.

[5] It is possible that the wording of this question is interpreted to include masses of strangers under the "other non-family member(s) option. This would problematically combine strangers with whom very little social interaction would occur with other weak ties where passive engagement might be more meaningful. For example, riding mass transit may involve "passive engagement" with many strangers, which is different in meaning that passive engagement with a co-worker at work. Supplemental analyses show that these types of situations are very rare, occurring in less than 2 percent of interactions, suggesting that most participants are not interpreting the question to include masses of strangers.

[6] I treat spouse/partner as a separate and stronger tie than other family members because past research suggest that many graduate students spend significantly more time with their spouse/partner than with their family (Rummell 2015). This suggests that, for this population, spouses/partners represent a stronger tie than family members. It is reasonable to expect that one's own children would be the strongest possible tie. Unfortunately, less than 2 percent of interactions include a child and only about 6 percent of this sample even has a child, meaning it has to be lumped into a larger category. I coded children as family rather than spouse/partner because interactions with children are more similar to interactions with other family members than they are to interactions with spouses and partners. For example, interactions with family and children both tended to include multiple interaction partners and rarely happen while working or consuming media. In contrast, interactions with spouses and partners tended to only involve the participant and partner and are often spent in leisure, sometimes while working, and often

prioritize the strongest tie in an interaction in my coding of variables.[7] To capture instances like these, I created an indicator variable to indicate interactions with *multiple partners*. Only 9 percent of activities involve multiple interaction partners. As shown in Table 3.1, almost half of daily activities are engaged while being alone. 18 percent of activities are engaged with an acquaintance, 9 percent with friends, 5 percent with family, and 20 percent with spouses/partners.

Form of engagement captures whether the participant is actively engaging in the activity with their interaction partner(s) or if their interaction partner is merely co-present, with being alone as the reference category. Interactions with both passive and active engagement are coded as having active engagement.[8] Because both the interaction partner and forms of engagement measures share being alone as the reference category, I use 8 interaction-indicators for each combination of partner by form of engagement compared to being alone rather than the traditional full factorial of the two variables (i.e., main effects for interaction partner and form of engagement with their interactions). The two coding schemes are mathematically equivalent, but the interaction-indicator coding scheme simplifies the presentation of results by removing empty interactions like "alone × active engagement."

---

while consuming media. Results are substantively similar when children are included with spouses and partners (see supplement S1).

[7] Due to the large number of potential interaction combinations (4 active × 4 passive partners) and small cell sizes in these categories, I had to collapse these categories in my coding of this variable. Alternative specifications prioritizing active engagement partner leads to substantively similar results.

[8] Supplemental analyses included an active + passive engagement category, but this category did not significantly differ from just active engagement. Thus, I present the more parsimonious coding.

Analytic Strategy

My analyses proceed in three stages, testing each of my three hypotheses. All analyses use random-intercept models to account for the clustering of activities within participant. All analyses also include controls for race, gender, sexuality, age, activity, weekend versus weekday status, and round of data collection.[9] As a preliminary step, I ran an intercept-only model to assess variation at different levels of analysis. The intercept-only model shows that the intercept variance for the participant level is significant ($\tau^2 = .866$, $p < .001$), suggesting differences across participants. The intraclass correlation suggests that about 50 percent of the variance in loneliness is due to participant-differences and the other half is due to differences across interactions within participants ($\rho = .496$). My first model predicts loneliness using interaction partners. Then, I predict loneliness using form of engagement. Finally, I predict loneliness using an interaction between partner and form of engagement using 8 interaction-indicators for each combination of partner by form of engagement compared to being alone. Post-estimation Wald tests are used to make pairwise comparisons between predicted values of loneliness across various categories of interest.

[9] I use random intercept models rather than fixed effects models because I am interested in comparing time invariant demographic characteristics in my sample. Results are substantively similar using fixed effects and are included in supplement S2.

Table 3.2. Random Intercept Regression Results for Loneliness on Interaction Partners and Form of Engagement (N_{level1} = 21,245; N_{level2} = 627)

	Model 1	Model 2	Model 3
Acquaintance	–.332***		
	(.019)		
Friend	–.560***		
	(.026)		
Family	–.447***		
	(.034)		
Spouse/Partner	–.546***		
	(.022)		
Passive Engagement		–.269***	
		(.020)	
Active Engagement		–.524***	
		(.015)	
Acquaintance × Passive Engagement			–.165***
			(.025)
Friend × Passive Engagement			–.471***
			(.069)
Family × Passive Engagement			–.245***
			(.073)
Spouse/Partner × Passive Engagement			–.422***
			(.035)
Acquaintance × Active Engagement			–.463***
			(.024)
Friend × Active Engagement			–.576***
			(.027)
Family × Active Engagement			–.488***
			(.036)
Spouse/Partner × Active Engagement			–.582***
			(.024)
Multiple Partners	.019		.003
	(.026)		(.026)
Traveling	–.046*	–.041	–.046*
	(.023)	(.023)	(.023)
Working	.061**	.069**	.049*
	(.022)	(.021)	(.022)
Housework/Carework	.005	–.009	–.007
	(.024)	(.024)	(.024)
Leisure	–.039	–.028	–.022
	(.025)	(.025)	(.025)
Media	.062*	.039	.049
	(.025)	(.025)	(.025)
Other Activities	–.005	.000	–.005
	(.044)	(.044)	(.044)
Weekend	.032*	.011	.031*
	(.015)	(.014)	(.015)
Constant	2.202***	2.202***	2.200***
	(.226)	(.227)	(.226)
ρ	.490	.492	.492

Note: Alone is the reference category. Standard errors in parentheses. A level 2 random intercept for participant is included to account for clustering. Controls for race, gender, sexuality, age, and round of data collection are included but not shown in the table. * $p < .05$, ** $p < .01$, *** $p < .001$, two-tailed tests.

Results

Tie Strength and Loneliness

Table 3.2 includes results from random intercept regressions of loneliness on interaction partners. Consistent with prior work, all forms of association significantly reduce sense of loneliness compared to being alone (all $p < .001$, two-tailed). However, forms of association do not have a uniform effect on reducing loneliness. As expected, weak tie interactions like those with acquaintances are significantly less beneficial than interactions with stronger ties in Model 1. Interactions with acquaintances are significantly less beneficial than interactions with friends ($\Delta = –.332 – (–.560) = .229$, $p < .001$), family ($\Delta = –.332 + .447 = .115$, $p < .01$), and spouses/partners ($\Delta = –.332 + .546 = .215$, $p < .001$).[10]

However, interactions with increasingly stronger ties are not associated with greater reductions in a sense of loneliness. In fact, interactions with friends and spouses/partners are statistically indistinguishable ($\Delta = .014$, *n.s.*), and interactions with friends are more beneficial than even interactions with non-spouse family ($\Delta = .113$, $p < .01$). Overall, these results suggest a clear distinction to be made between acquaintances and stronger-tie associates. Results also suggest that strong ties like family may not more strongly reduce loneliness than other ties among this population of graduate students, a point I will discuss in further detail in the discussion.

[10] I walk through these difference of differences for the first few comparisons, but do not provide this level of detail for all comparisons presented for brevity.

Engagement Form and Loneliness

Having examined the effects of interaction partners on sense of loneliness, I move on to examine the effects of form of engagement on loneliness. Model 2 of Table 3.2 shows results from these models. Relative to being alone, both passive and active engagement is significantly related to less loneliness ($p < .001$). Consistent with expectations, I find that active engagement has a larger effect on loneliness than passive engagement ($\Delta = .255$, $p < .001$). Indeed, the difference between active and passive engagement is nearly as large as the difference between passive engagement and being alone (.255 vs. .269).

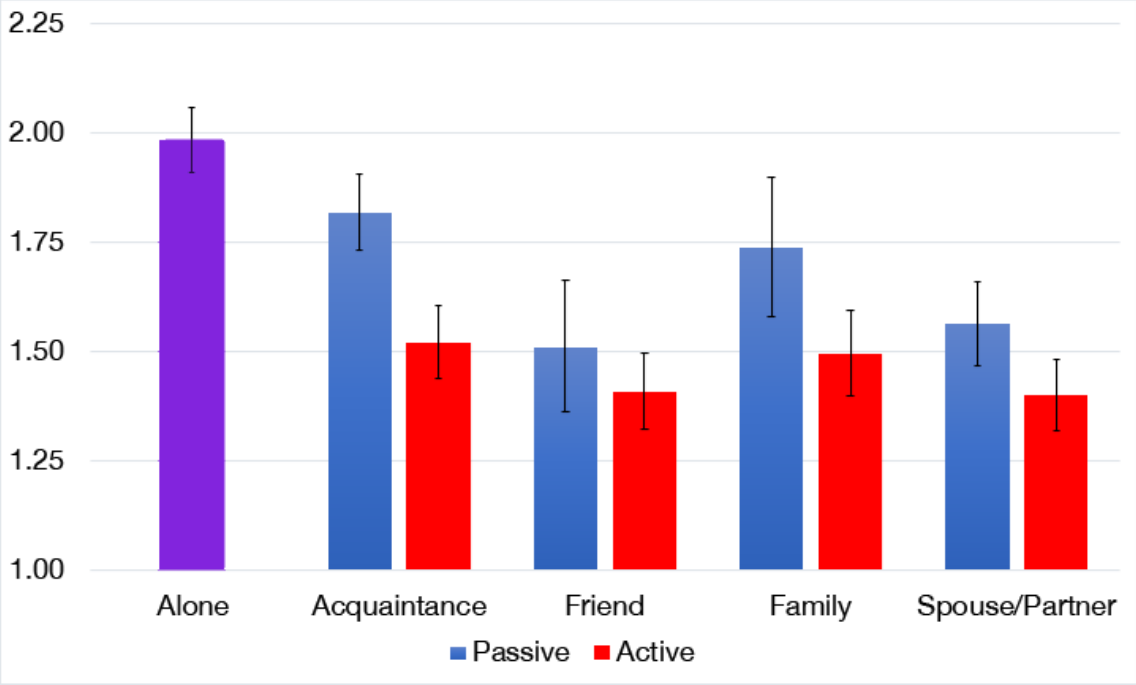


Figure 3.1. Predicted Loneliness by Interaction Partner and Form of Engagement

Note: Predicted values from models adjusting for race, gender, sexuality, age, activity, weekend status, and round of data collect. Bars are 95% confidence intervals. Non-overlapping confidence intervals indicate statistically significant differences; overlapping confidence intervals do *not* necessarily mean differences are not statistically significant (Schenker and Gentleman 2001). Please refer to text for significant pairwise comparisons.

The Interaction Between Tie Strength and Engagement Form

My final set of analyses shown in Model 3 of Table 3.2 examines if interaction partner influences loneliness differently by form of engagement. As shown in the table, all types of interaction partner and forms of engagement are significantly related to lower levels of loneliness ($p < .001$ across contrasts). However, active engagement across interaction partner type is related to larger effects (b's range from –.463 to –.582) compared to passive engagement (b's range from –.165 to –.471). Also evident in the table is the relative lack of variation in effects across interaction partners when actively engaged compared to passive engagement. Collectively, these results suggest that the benefit of active compared to passive engagement varies widely by interaction partner. Figure 3.1 graphically demonstrates these differences and I more formally test these differences below.

To more formally test for an interactive effect between engagement form and tie strength, I test for differences between active and passive engagement within interaction partner type and whether these differences are themselves significantly different from one another. These results show that active engagement is related to the largest reduction in loneliness for acquaintances ($\Delta = .298$, $p < .001$), followed by family ($\Delta = .243$, $p < .01$), partner ($\Delta = .160$, $p < .001$), and friends ($\Delta = .105$, *n.s.*). This provides evidence for the idea that active engagement does not benefit all relationships equally. I posited that the stronger the relationship, the less likely that active engagement is necessary. Differences comparing the effects of active compared to passive engagement by interaction partner type provide partial support for this expectation.

Consistent with expectations, the effect of active engagement for acquaintances is larger than those for friends and spouses/partners (Δ_2 = .298 – .105 = .193 and Δ_2 = .298 – .160 = .138 for friend and spouse/partner comparisons, respectively, $p < .05$ across contrasts). However, contrary to expectations, there is no difference between the effect of active engagement for acquaintances and for family (Δ_2 = .298 – .243 = .054, *n.s.)*. Indeed, looking at the patterns of effects suggests a distinction to be made between acquaintances and non-spouse family on the one hand and friends and spouses/partners on the other.

Including both tie strength and form of engagement in the same model alters the difference in loneliness among acquaintances and non-spouse family reported in Model 1. In Model 1, non-spouse family associated with significantly less loneliness than did the presence of acquaintances (Δ = –.447 + .332 = –.115, $p < .01$). The inclusion of form of engagement in Model 3 reduces the difference between non-spouse family and acquaintances to non-significance (Δ = –.054, *n.s.*). This indicates that the benefit of non-spouse family relative acquaintances in Model 1 is explained by participants tending to interact more passively with acquaintances relative to non-spouse family. Consistent with this interpretation, supplemental analyses show that 45% of activities with acquaintances are passive, whereas only 11% of activities with friends, 17% of activities with non-spouse family, and 24% of activities with spouses/partners are passive.

Discussion

I sought to examine tie strength, form of engagement, and how they jointly influence perceptions of loneliness in daily interactions. Results largely support my expectations. Consistent with prior research (van Roekel et al. 2015, 2018), engagement with strong

ties generally associated with reduced feelings of loneliness relative to engagement with weak ties. Also as expected but unexamined in previous research, active engagement (i.e., shared engagement in an activity) associated with reduced feelings of loneliness relative to passive engagement (i.e., mere co-presence), and passive engagement associated with reduced feelings of loneliness relative to social isolation. When analyzing these two processes concurrently, I found that engagement with both strong and weak ties can be similarly beneficial for reducing loneliness, but only when these ties were engaged with actively. This is consistent with research showing that weak tie interaction is beneficial for wellbeing (Sandstrom and Dunn 2014) as well as extends this research by showing that the benefit of weak ties is situationally dependent. These findings have several implications for future research and interventions. For example, these findings suggest that the loss of weak ties in old age is a potentially valuable area for intervention (Wrzus et al. 2013). These findings also highlight the importance of adjusting for engagement form. In my sample, participants engaged with weak ties more passively than they engaged with strong ties. This indicates that the advantage of strong ties over weak ties for reducing loneliness found in past research may be inflated due to not accounting for how people are engaging with these different ties.

Although findings are generally consistent with expectations, one unexpected finding is that the presence of friends and romantic partners were significantly more beneficial than the presence of family members, even after adjusting for how participants interacted with these different kinds of people. I conceived of friends as being weaker ties than kin, but this assumption may not apply to this sample of graduate students. Research on graduate students finds that contact with friends tends to be more important than

contact with family for promoting wellbeing (Hyun et al. 2006). This could mean friends, like romantic partners, are in fact stronger ties than family for individuals in their mid to late 20s. This conclusion is largely consistent with research which finds this time period to be characterized by increased autonomy from family and a desire to avoid parental influence (Arnett 2007), while friendships tend to increase in emotional depth (Arnett 2007; Collins and van Dulmen 2006).

The unique nature of my sample may also explain the heightened rates of loneliness observed among Hispanic and Asian participants, even after controlling for situational factors. Latinx participants and Asian participants are lonelier, all else equal, than white participants ($p < .05$ across contrasts). The greater loneliness among Latinx and Asian participants could be due to the former group's lack of representation among the graduate student body (Yang et al. 2009), and the latter group's higher likelihood of being international students (Myers-Walls et al. 2011), or they may be related to differences in income and discrimination (Sherry, Thomas, and Chui 2010). While my findings are somewhat consistent with the findings of previous research highlighting the unequal distribution of social isolation and loneliness by race, I do not know how my findings would be impacted by a more racially representative sample.

Overall, findings generally achieved statistical significance in the expected directions, and I believe these differences are substantively important as well. The effect sizes observed for type of partner, form of engagement, and the interaction of these factors are generally in line with or exceed the impact of other factors known to associate with loneliness, like race (Hawkley et al. 2008) and sexual identity (Grossman, D'augelli, and O'connell 2001; Westefeld et al. 2001). Indeed, the effects of type of interaction

partner, form of engagement, and their interactions are larger than any other effects found in my model, including demographic effects for race, gender, age, and sexuality. These effect sizes are also similar to those reported in related research (Tam and Chan 2019). However, given the potentially unique relationship between graduate students, family life, and race, more research should be done to tease out the nature of these relationships in a different population.

Limitations

Although this study provides a new lens through which scholars can better understand the value of social engagement with strong and weak ties, it has several limitations that could be addressed in future work that extend beyond sampling from other populations. First, this study does not account for the presence of strangers. Although participants could have reported strangers under the category "non-family other," they may have been unsure if it was appropriate to do so without a category that was clearly marked for strangers. Ultimately, supplementary analyses show that less than 3 percent of activities feature interactions with only non-family others. Separating these interactions from the acquaintance category does not notably alter my findings for acquaintances. I do not focus specifically on strangers in this study because participants may have underreported their presence and because they are not directly relevant to the hypotheses in this study. Future research may benefit from assessing the benefit or irrelevance of being around strangers by more clearly instructing participants to report on the presence of such people.

A second limitation of this study relates to participants dropping out of later rounds of data collection. This may indicate that my data are biased towards participants

who have more time to participate in the study. However, it is unclear how such bias would impact the conclusions drawn from my analyses, and, further, research finds that busier people are not systematically underrepresented in similar studies (Abraham, Maitland, and Bianchi 2006).

Two further limitations stand out as potentially impacting the conclusions of my analyses. The first relates to causality. Although my theoretical framework implies that type of interaction partner and form of engagement would lead to differences in sense of loneliness, it is possible that people who feel lonely are less engaged in interactions and/or seek out interactions with weaker ties. For example, people with a persistent and general sense of feeling lonely (those with high trait loneliness) tend to view social relationships more negatively (Hawkley, Preacher, and Cacioppo 2007) and may avoid social interactions as a result (Gable and Gosnell 2013). In an attempt to address this issue, I conducted supplemental analyses that account for trait loneliness using the abbreviated UCLA loneliness scale (ULS-4) (Russell 1996:100; Russell, Peplau, and Cutrona 1980). These analyses show that the results presented here are robust to differences in trait loneliness, lending empirical in addition to theoretical support of the causal direction presented. Unfortunately, this measure was only asked in the first round of data collection so including it in the main analyses would reduce the sample by nearly half. Therefore, these results should be taken as associational rather than causal.

The second limitation that could impact the conclusions drawn from this study relate to interpersonal conflict leading participants to choose passive engagement over active engagement. Further, such conflict may also affect how participants categorize others—for example, conflict with a friend may lead to that friend being redefined as an

acquaintance. Increased rates of loneliness during passive engagement (relative to active engagement) and during interaction with weak ties (relative to strong ties) may therefore relate to relationship problems rather than being due directly to form of engagement and tie strength. Although I lack a direct measure of relationship conflict, I do have detailed measures of the emotions experienced within each situation. I would expect that relationship conflict would manifest itself through the experience of anger or annoyance. Supplementary analyses show that both affective states correlate with feelings of loneliness, but my data indicate that these states do not influence the relationship between form of engagement, type of interaction partner, and loneliness (see supplement S3). I therefore conclude that my findings are likely not driven by relationship conflict, but future research would benefit from a more direct assessment of such strain.

Conclusion

This study advances our knowledge of the strength of weak ties by demonstrating that their ability to reduce feelings of loneliness may depend significantly on how they are engaged with—unlike strong ties, which appear largely beneficial regardless of engagement form. More generally, this study indicates that knowing the kind of person someone interacts with, but not how, leaves out an important detail for understanding the benefits of the engagement. These findings contribute to our knowledge of loneliness and should benefit future research by highlighting the value of measuring social engagement in different forms, rather than as an indicator variable signifying the presence or absence of others. These findings also support recent research identifying weak ties as a potentially important source of daily wellbeing (Sandstrom and Dunn 2014).

Chapter 4: Work-Schedule Conflict

Nonstandard work hours are becoming increasingly common, and these kinds of schedules associate with a range of negative outcomes for workers and their families (Bianchi and Milkie 2010). A central reason for these negative outcomes involves the challenges of finding time to be with others (Craig and Brown 2015; Matthews, Conger, and Wickrama 1996). In this chapter, I focus on how these challenges may negatively affect interactions with romantic partners, undercutting their value for avoiding loneliness. Although research proposes a connection between such work-schedule conflict and loneliness (Matthews et al. 1996; Mills and Täht 2010), loneliness has not received attention in empirical research looking at the consequences of work-schedule conflict. For example, recent review articles identify a broad range of mental and physical health consequences for work-schedule conflict, including psychological distress, fatigue, stress, and reduced wellbeing, but not loneliness (Ford, Heinen, and Langkamer 2007; Shaffer, Joplin, and Hsu 2011). Yet, given the importance of engaging with strong ties for avoiding loneliness (see ch.3 in this dissertation), work-schedule conflict has the potential to be a significant source of loneliness for those whose work schedules routinely separate them from their partners.

Loneliness and Romantic Partners

Loneliness is the subjective perception of being alone. It is a psychological pain that likely evolved as a signal that an individual's connections are weakening, and therefore motivates behaviors that—at least in our evolutionary environment—improved survivability (Cacioppo et al. 2006, 2011). Beyond this, loneliness is often defined by what it is not. Loneliness is not aloneness (Peplau and Perlman 1982). People can feel

lonely among others, and people can resist loneliness even after extended periods of social isolation (Hawkley et al. 2008). Although loneliness can accompany instances of social exclusion and rejection, loneliness is distinct from both (Cacioppo, Cacioppo, and Boomsma 2014). Beyond associating with depressive symptoms, loneliness heightens feelings of insecurity and sensitivity to threats (Cacioppo et al. 2006; Cacioppo and Cacioppo 2014). It is this association with stress that explains many of the negative health outcomes of loneliness, which are on par with cigarette smoking, blood pressure, and obesity (Cacioppo et al. 2002; Hawkley and Cacioppo 2010; House et al. 1988).

Research typically conceives of loneliness in two forms: trait and state. Trait loneliness reflects persistent feelings of loneliness over long periods of time, while state loneliness reflects the day-to-day occurrence of loneliness. Both conceptions of loneliness are important. Trait loneliness is important due to its association with negative mental and physical health (Hawkley and Cacioppo 2010). State loneliness is important due to both its association with trait loneliness and its role in in the process that eventually leads to trait loneliness (van Roekel et al. 2018; van Winkel et al. 2017). State loneliness is also valuable for allowing analysis of the contexts that elicit feelings of loneliness in daily life. Given that approximately half (46%) of Americans report "sometimes or always" feeling alone (Cigna and Ipsos 2018), it is important to identify the factors contributing to both forms of loneliness.

Research has identified several factors that associate with the experience of trait loneliness—for example, educational attainment, income (Savikko et al. 2005), employment (Hawkley et al. 2005), and marriage (Hawkley et al. 2008). Research finds that these factors come to associate with trait loneliness by shaping the quantity and

quality of relationships in people's lives (Hawkley et al. 2008). For example, although people can be single without being lonely (Klinenberg 2013), marital status is valuable for avoiding loneliness because it means that a person has at least one social connection (Hawkley et al. 2008). Moreover, this social connection is likely more valuable than most. Research finds that the presence of strong ties, such as romantic partners, are more beneficial than other kinds of ties for avoiding feelings of loneliness throughout daily life, i.e. state loneliness (van Roekel et al. 2015, 2018). Although no research has examined the value of romantic partners relative to other strong ties for avoiding state loneliness, there is reason to believe the presence of romantic partners will be especially important for those who are in a relationship, due to the tendency for romantic relationships to replace other forms of interaction. For example, those who marry appear to form fewer friendships than those who remain single (Keith 1986). Consistent with this claim, General Social Survey (GSS) data show that married women over 35 are less likely to engage with a friend (both in person and via other methods, such as a phone call) in a week relative to their single counterparts (Klinenberg 2013:97). They are also less likely to be a member of a secular social group and less likely to spend a social evening with neighbors. Further, support and strain from partners has a stronger impact on wellbeing than does support and strain from other strong ties, such as friends and family (Walen and Lachman 2000).

Overall, of all those who we can spend time with, strong ties appear the most beneficial for avoiding loneliness, and partners are likely the most beneficial of all. Work schedules that conflict with people's ability to spent time with partners may be a detriment to not only the quantity but also the quality of interactions with partners, which,

given their importance to wellbeing, may result in a significant increase in loneliness. In the sections that follow, I discuss work-schedule conflict broadly, then focus on the mechanisms that may explain why work-schedule conflict may reduce relationship quality and lead to loneliness.

Work-Schedule Conflict and Relationship Quality

Work-schedule conflict here refers to a lack of availability of a partner due to incompatible work schedules, though research often broadens this conflict to include the difficulty of finding time for a person's entire family due to the demands of an employer. This conflict is partly due to increased labor-force participation of mothers (Craig and Brown 2015) and especially the growth of nonstandard work schedules—i.e., work that occurs outside of the traditional workweek and/or outside of traditional work times (Bianchi and Milkie 2010). Nonstandard work schedules often not only make it more difficult to find time for partners and family, but also other non-work relationships, such as friends, as well as clubs, voluntary work, and civic activities (Craig and Brown 2015). Perhaps as a consequence of these disruptions to important social relationships and communities, workers with nonstandard schedules tend to have poorer physical and mental health than do workers with standard schedules (Jamal 2004). While part of the detriment of nonstandard schedules relate to the absence of time spent with important others (Craig and Brown 2015; Young and Lim 2014), such work-schedule conflict may also undercut the value of time spent with important others, specifically romantic partners, by diminishing the quality of the relationship.

Nonstandard work hours associate with a wide range of negative impacts on romantic partnerships, including higher rates of divorce and reduced marital quality

(Kalil, Ziol-Guest, and Levin Epstein 2010; Matthews et al. 1996; White and Keith 1990). Nonstandard work hours associates with increased work-family conflict, and Matthews et al. (1996) propose several avenues through which such conflict leads to negative outcomes for relationships, the most relevant of which is that time constraints which leaves someone unable to fulfill relationship duties can result in a range of negative feelings, such as anger and guilt, and culminate in heightened feelings of distress. These heightened feeling of distress then lead to more negative behaviors (e.g., anger, hostility, and irritability) and fewer supportive behaviors (e.g., smiling and laughing) when interacting with partners, which reduce relationship quality.

A separate reason why work-schedule conflict may reduce relationship quality is via stress and stress spillover. Nonstandard work schedules often take a physical and mental toll on workers, including heightened rates of lethargy and stress (Fenwick and Tausig 2001). Such heightened stress can spread into other aspects of a person's life (i.e., spillover), including interaction with partners, resulting in negative behaviors, reduced relationship quality, and maladaptive behaviors (Bolger et al. 1989; Neff and Karney 2004). Stress can also lead to distancing during times of high stress as a way to avoid relationship strain (Lavee and Ben-Ari 2007), though this may be an unappealing option for couples who already struggle to find time for each other, resulting in stress potentially being highly problematic for couples experiencing work-schedule conflict.

Interaction quality is an important predictor of trait loneliness (Hawkley et al. 2008), and likely state loneliness as well. Whether due to a lack of time spent together or stress spillover, diminished relationship quality with partners should undercut the benefit of engaging with partners for avoiding state loneliness. Therefore, interactions with

romantic partners should become less beneficial as schedule conflict increases, and this should be explained by reduced feelings of closeness and connection during the interaction.

Hypothesis 1: Increasing schedule conflict will associate with increased rates of state loneliness when with partners.

Hypothesis 2: Feelings of closeness and connection will explain why increasing schedule conflict associates with increased rates of state loneliness when with partners.

Trait Loneliness

An alternative explanation for hypothesis 1 relates to the potential association between schedule conflict and trait loneliness. Trait loneliness is partly the outcome of having few and/or unsupportive ties over a long period of time (Hawkley et al. 2008). Roles such as marriage and employment associate negatively with trait loneliness because they expand individuals' networks of connections—yet, as discussed in the previous sections, employment can also conflict with important relationships due to incompatible work schedules. Participants who report difficulty finding time to be with their romantic partners may have endured this challenge over an extended period of time, resulting in the routine experience of state loneliness that eventually develops into feelings of trait loneliness. Increased trait loneliness associates with less positive and more negative interpretations of interactions (Hawkley et al. 2007), potentially elevating state loneliness when in the presence of others. In this study, I do not have data that can show that schedule conflict leads to trait loneliness, but I can examine how feelings of state

loneliness vary with trait loneliness when in the presence of romantic partners, which may explain the expected association in hypothesis 1.

Methods

Data

I test my hypotheses with a sample of 168 participants recruited from Amazon's Mechanical Turk (MTurk) and Prolific Academic. These are the 168 participants who reported having a romantic partner in the larger sample of 310 participants reported in ch.2 and 3, and who reported partner engagement in their time diaries. I focus my analyses on the 391 time diaries produced by these 168 participants. Further, the variable for closeness is only recorded when participants are in the presence of others. To keep sample size consistent between models, I drop activities engaged in alone. This leaves 1,924 activities available for the analyses. Table 4.1 includes descriptive statistics for the final sample as well as measures of interest, described in the next section. As shown in the table, the sample is predominantly white (81 percent), women (66 percent), heterosexual (86 percent), married (74 percent) and has a mean age of 41 years.

Table 4.1. Descriptive Statistics for All Variables

Variable	Mean/Proportion (SD)
Dependent Variable	
State Loneliness	1.22 (.73)
Situational Variables	
Active Engagement	.83
Passive Engagement	.17
Closeness	5.269 (1.73)
Individual-Level Variables	
Schedule Conflict	2.14 (.95)
White	.81
Latinx	.04
Black	.05
Asian	.03
Other Race	.01
Multiracial	.06
Man	.34
Woman	.66
Sexual Minority	.15
Heterosexual	.86
Age	40.7 (10.07)
Married	.74
Dating	.26
Full Time (ref. category)	.49
Part Time	.19
Unemployed	.08
NIL	.23
Total Hours	28.86 (16.05)
Trait Loneliness	1.65 (.69)
$N_{\text{level 1}}$	168
$N_{\text{level 2}}$	1,924

To complete a time diary, participants were asked to report on every activity they engaged in between midnight and 11:59PM on a given day. These activities are matched to pre-coded activities used in the American Time Use Survey (U.S. Bureau of Labor Statistics and U.S. Census Bureau 2016). If the participants entered an activity that could

not be matched to an existing category, they were asked to categorize the activity into existing codes to the best of their abilities.

Measures

Survey

Schedule conflict indicates participants' difficulty finding time to be with their partner. Participants provided this data by responding to this question, "When you have free time, does your spouse's / partner's work schedule prevent you from spending time together?" Response options include Never, Rarely, Sometimes, Often, and Always. The mean response was approximately 2.14—i.e., between Rarely and Sometimes, but closer to Rarely.

Work status captures participants' response to this question, "Which category best describes your current employment status?" Response options include Employed full time, Employed part time, Unemployed, and Not in the labor force (NIL) (due to being retired, disabled, stay-at-home parent, or for other reasons).

Total hours captures the number of hours participants worked at their main job in a typical week (if employed) or the number of participants worked for pay (if unemployed or NIL). Values for this variable range from 0 to 80 hours a week.

Trait loneliness is captured by the 20-item UCLA Loneliness Scale (Russell et al. 1980).

Time Diary

State loneliness is measured at the activity level with a question asking, "How lonely did you feel during this time?" with response categories ranging from 1 "Not at all" to 7 "Very much." This question wording is consistent with the question wording used by past

research assessing momentary loneliness (van Roekel et al. 2015, 2018; Tam and Chan 2019; van Winkel et al. 2017). As shown in Table 4.1, the mean level of loneliness experienced in this study is relatively low, at about 1.22 on the 1 to 7 scale.

Interaction partner categorizes the presence of others in the situation. In this chapter, I am only interested in engagement with romantic partners. Therefore, if a situation included a romantic partner, I included the case in the model. However, if the situation only included other kinds of ties (e.g., other strong ties, such as family members, or weak ties, such as co-workers), these cases were excluded from the model.

Passive engagement captures whether the participant is around others without engaging in a shared activity (i.e., active engagement) with their interaction partner(s). Active engagement is the reference category. Interactions with both passive and active engagement are coded as being active engagement.

Analytic Strategy

My analysis begins by assessing the direct effect of schedule conflict on state loneliness when in the presence of romantic partners. Next, I control for feelings of closeness and note how the inclusion of this variable affects the coefficient for schedule conflict. Lastly, I control for trait loneliness and note how the inclusion of this variable affects the coefficient for schedule conflict. All analyses use random-intercept models to account for the clustering of cases within participant.

Results

Schedule Conflict, Closeness, and Trait Loneliness

Table 4.2. Random Intercept Regression Results for State Loneliness on Schedule Conflict During Engagement with Romantic Partners (N_{level1} = 1,924; N_{level2} = 168)

		Model 1	Model 2	Model 3
Schedule Conflict		.069†	.05	.01
		(.058)	(.036)	(.034)
Passive Engagement		.162***	.023	.147***
		(.041)	(.044)	(.041)
Work Status				
	Part Time	.165	.16	.054
		(.121)	(.115)	(.106)
	Unemployed	-.11	-.101	.013
		(.169)	(.16)	(.147)
	NIL	.299*	.281*	.232†
		(.139)	(.132)	(.121)
Total Hours		.004	.004	.007*
		(.004)	(.003)	(.003)
Closeness		—	-.09***	—
			(.011)	
Trait Loneliness		—	—	.393***
				(.053)
Constant		1.058***	1.51***	.245
		(.004)	(.255)	(.252)

Note: Models only includes cases featuring engagement with a romantic partner. Standard errors in parentheses. A level 2 random intercept for participant is included to account for clustering. Controls for race, gender, sexuality, age, and marital status are included but not shown in the table. † p < .1, * p < .05, ** p < .01, *** p < .001, two-tailed tests.

Table 4.2 includes results from random intercept regressions of state loneliness on schedule conflict when in the presence of a romantic partner. Model 1 tests hypothesis 1,

which states that schedule conflict will associate positively with state loneliness when in the presence of partners. Model 1 supports hypothesis 1 ($p < .05$, one-tailed).

Hypothesis 2 stated that the interaction between schedule conflict and partner interaction would be explained by diminished relationship quality, captured by feelings of closeness and connection in the situation. Model 2 supports this hypothesis, in that the relationship between schedule conflict fell from significance to no significance after including closeness in the model.

Although feelings of closeness appear to explain part of the relationship between schedule conflict and state loneliness, the magnitude of the change in the schedule conflict coefficient is small (.069 before controlling for closeness vs. .05 after controlling for closeness, $\Delta = .019$). It may therefore be valuable to also examine the role of trait loneliness for explaining why increasing schedule conflict associates with heightened state loneliness when in the presence of romantic partners. Model 3 shows that when controlling for trait loneliness, the coefficient for schedule conflict drops to insignificance. The magnitude of the change in coefficients is also much larger than the change observed when controlling for closeness ($\Delta = .059$ vs. $\Delta = .019$), indicating that trait loneliness explains more of the association between schedule conflict and state loneliness than does closeness. This means that those who report schedule conflict with partners are likely higher in trait loneliness than those who report less schedule conflict, and that such trait loneliness may be the driving force behind the reduced benefit of engagement with romantic partners. Supplemental analyses confirm that there is a positive, statistically significant correlation between trait loneliness and schedule conflict.

Lastly, along with the measure of schedule conflict with partners, I also measured the extent to which work-schedule conflict prevented participants from interacting with their friends. Replacing partner schedule conflict with friend schedule conflict in the previously reported analyses reveals a lack of a statistically significant association between schedule conflict with friends and state loneliness when in the presence of romantic partners (Table S4). This indicates that the measure of schedule conflict with partners is capturing more than just a general difficulty to find time to be with important others, but rather captures challenges specific to the romantic relationship.

Discussion

Strong-tie engagement is important for avoiding state loneliness, and, for those in relationships, engagement with partners may be especially important (Hawkley et al. 2008; van Roekel et al. 2018; Walen and Lachman 2000). This study focused on the challenge of finding time to be with partners due to conflicting work schedules. Although such schedule conflict is likely to lead to negative outcomes due to spending more time alone (Craig and Brown 2015; Young and Lim 2014), in this study I focused on the possible detriments schedule conflict brings into engagement with partners, and I proposed that schedule conflict would diminish relationship quality and therefore undercut the value of romantic partner engagement for reducing the experience of state loneliness. As expected, increasing levels of schedule conflict associated with higher rates of state loneliness when in the presence of romantic partners. Overall, this increase in loneliness appears related to diminished feelings of closeness when in the presence of partners, however the interaction between schedule conflict and engagement with romantic partners appears to be better explained by trait loneliness.

The dependent variable in this chapter, state loneliness, reflects the changing experience of loneliness throughout a day. Trait loneliness, in contrast, reflects a predisposition towards loneliness. Whereas state loneliness can be triggered as an immediate reaction to features of the situation (see ch.3), trait loneliness is partly genetic and partly the culmination of a long-term process in which a person typically has few connections and/or unsupportive connections in their life, and therefore comes to see themselves as generally lonely (Cacioppo et al. 2011; Hawkley et al. 2007). Although I cannot speak to causation, the experience of schedule conflict over an extended period of time is likely to facilitate the process culminating in trait loneliness, but not for everyone. For example, although there is a strong association between schedule conflict and trait loneliness in my sample, among participants who reported the most severe scheduling conflict (i.e., those who reported "often" or "always" experiencing schedule conflict when trying to find time to be with partners), approximately 34% reported rarely or never experiencing the symptoms of trait loneliness. These findings highlight the importance of assessing both state and trait loneliness as outcomes of schedule conflict, but also highlight how part of understanding this relationship should include a focus on factors that allow individuals to avoid the experience of loneliness despite schedule conflict. This will likely include the development of effective communication and coordination strategies (Mills and Täht 2010), however such strategies are not captured in the present dataset.

Although situational feelings of closeness predict state loneliness, feelings of closeness were less important for understanding the interaction between schedule conflict and partner engagement relative to trait loneliness. Schedule conflict is thought to

degrade the quality of relationships via two potential mechanisms, an inability to fulfill relationship requirements and stress spillover, both of which should lead to negative behaviors, reduced relationship quality, and therefore I anticipated would degrade feelings of closeness (Bolger et al. 1989; Matthews et al. 1996; Neff and Karney 2004). Closeness, as conceived of and measured in this chapter, is thought to fluctuate around a more global baseline that comes to be set for each relationship (Lavee and Ben-Ari 2007). I lack this global measure of relationship quality, and it is conceivable that a global measure may have better captured the proposed mechanism.

Trait loneliness associates with negative perceptions of social engagement (Hawkley et al. 2007). In this chapter, I focused on engagement with romantic partners, but trait loneliness may degrade the benefits of engagement with other kinds of ties as well. Research on work-schedule conflict and nonstandard work hours often focuses on its negative effects on romantic partners and families (Bianchi and Milkie 2010; Matthews et al. 1996; Mills and Täht 2010), however, analyzing the engagement that replaces engagement with romantic partners—for example, engagement with co-workers—may be fruitful for better understanding the detriments of work-schedule conflict and nonstandard work on wellbeing.

Overall, this chapter is valuable for extending research on schedule conflict by focusing on its relationship with loneliness, both in its trait and state forms. As expected, schedule conflict associated with a diminishing capacity for partner engagement to reduce state loneliness, yet the situational explanations for this association appear relatively less important for understanding this relationship relative to individual factors.

Future research is needed to investigate the detrimental effects schedule conflict has on engagement, both engagement with partners and other ties.

Chapter 5: Discussion and Future Research

Loneliness ebbs and flows throughout the day, but what factors shape its peaks and troughs? Loneliness is the perception of being alone, yet people can feel alone among others and endure extended periods of social isolation without feeling any loneliness (Cacioppo et al. 2011). This indicates that simply knowing if a person is alone in a situation says very little about how lonely that person is likely to feel, and that understanding what shapes state loneliness requires a focus on the context surrounding the experience of such loneliness. Consistently, research shows how state loneliness varies by who a person is with in a setting (van Roekel et al. 2015, 2018), the meaningfulness of the activity, and the time of the week (Tam and Chan 2019), but little research has explored this topic further (van Roekel et al. 2018). In this dissertation, I sought to answer my research question by extending this research.

I extend research on state loneliness through three empirical studies. First, I proposed that being alone is most likely to lead to feelings of loneliness in situations where a person is isolated when they are expected to be social, relative to being isolated in situations that are less normatively social. This proposition led me to focus on situational factors which I anticipated would lead to a situation being viewed as more or less normatively social—specifically, time of the day and week, activity, and location. I assessed these relationships in Study 1 (see ch.2). Second, I proposed that how people engage with each other has important implications for how beneficial the engagement is for reducing state loneliness, and that the importance of engagement would be greatest among those people are the least close to (i.e., weak ties, such as co-workers and acquaintances). I anticipated that the closeness people felt towards their stronger ties

would ensure their presence of was beneficial regardless of how they were engaged with, while the closeness that accompanies direct engagement would be necessary to benefit from the presence of weak ties. I assessed these relationships in Study 2 (see ch.3). Third, I proposed that engagement with a centrally important strong tie—romantic partners—would become less beneficial for avoiding state loneliness as participants reported greater difficulty scheduling their time together, due to incompatible work schedules. I anticipated this detrimental effect of work-schedule conflict due to negative effects such conflict can have on relationship quality (Matthews et al. 1996), and the importance of relationship quality for avoiding loneliness (Hawkley et al. 2008). I assessed this relationship in Study 3 (see ch.4). Taken together, these three separate approaches answer my research question by focusing on important factors for understanding state loneliness when isolated—specifically, *when*, *where*, and *what* is being done, and important factors for understanding state loneliness when in the presence of others—specifically, *who* and *how* they are engaging with these others.

In the discussion that follows I delve further into the factors that I have put forward as answers to the research question motivating this dissertation. I do so by first reviewing the analyses, findings, and central contributions of each of my three studies. I then discuss the unexpected findings present in each of these studies and their implications for future research.

Main Findings and Primary Contributions

In Study 1 I recruited two online samples, one of which I restricted to only graduate students, and both rated different activities, locations, and times of the day and week as more or less normatively social. I then merged these data with time-use data collected

from graduate students and online participants, and I assessed the relationship between social expectation and state loneliness while socially isolated. Results came out as expected for time, in that participants felt loneliest when alone during normatively social times, but results did not come out as expected from activity and location. However, findings were consistent between the graduate student and online participants in that time spent eating, engaging in leisure, and time spent at home benefitted the most from the presence of others in both samples, while time spent working and at work associated with the least benefit from the presence of others. Recent research on loneliness highlights the disconnect between being alone and feeling alone, yet little research has investigated the conditions under which being alone is most likely to lead to loneliness (van Roekel et al. 2018). These findings therefore make a major contribution to the literature by highlighting significant factors that associate with the experience of loneliness while isolated.

In Study 2, graduate students reported time-use data that recorded who they engaged with and how they engaged with these people across multiple daily activities. For who they engaged with, I focused on the distinction between strong ties (i.e., romantic partners, friends, and family) and weak ties (e.g., acquaintances and co-workers). For how they engaged with others, I had participants specify if they engaged with these people in a shared activity (i.e., "actively") or if these people were merely present in the situation (i.e., "passively"). Results largely came out as expected. Active engagement associated with lower rates of loneliness relative to passive engagement, engaging with strong ties associated with lower rates of loneliness relative to engagement with weak ties, and the benefit of active over passive engagement was strongest among

weak ties and, unexpectedly, family members. I believe that family members seemed more like weak ties in this graduate student sample due to participants being in a period of their life where they may be trying to be independent from their families, however I lack the data necessary to speak to this possibility further. Overall, these findings make two major contribution to the literature. First, these findings show the importance of measuring how people engage with others, as opposed to the approach taken by other research which only measures if the person is present. Second, recent research highlights the value of weak-tie interaction for supporting wellbeing (Sandstrom and Dunn 2014), and my findings show that the benefit of weak-tie engagement may be more situationally dependent than strong-tie engagement. Put differently, relative to strong ties, my findings indicate that it may be more important to understand the context of the engagement with weak ties to predict their benefit—in this case, how they were engaged with.

In Study 3, online participants reported the same time-use data reported in Study 1 and 2, as well as reported the extent to which they experienced difficulty finding time to be with their romantic partner due to their work schedule. Participants reported this work-schedule conflict data in the survey preceding the time diary. The analysis only included cases involving engagement with a romantic partner, and I assessed my expectations by predicting state loneliness and focusing on the coefficient for work-schedule conflict. Results only partly came out as expected. As anticipated, as participants reported greater difficulty finding time to be with romantic partners due to work-schedule conflicts, engagement with romantic partners associated with greater state loneliness. Next, I included feelings of closeness in the model, and then replaced feelings of closeness with trait loneliness. Unexpectedly, the inclusion of trait loneliness associated with a much

larger reduction in the schedule-conflict coefficient then did the inclusion of the closeness variable, indicating that the association between work-schedule conflict and state loneliness is related more to changes in trait loneliness among those experiencing work-schedule conflict rather than changes in closeness. The primary contribution of these findings can be found in how they highlight the relevance of loneliness to work-schedule conflict and nonstandard employment. I acknowledge however that this contribution is currently hampered by a lack of clarity behind why trait loneliness associated with work-schedule conflict. I discuss this relationship further in the next section.

Unexpected Findings and Future Research

The lives of graduate students are unusual relative to those outside of academia. To many, this has led to a perception of graduate school as being isolating, all-consuming, and associated with negative implication for mental health. Research provides some support for these views (Dix 2007; Hefner and Eisenberg 2009). Consequently, I anticipated that graduate students may feel different expectations regarding how social they should be, and I anticipated that these expectations would be centrally important for explaining why some moments of isolation are more damaging than others. I therefore analyzed graduate students separately from the online sample in Study 1—yet, ultimately, I found the expectations for social behavior to be quite similar between both samples. Further, I found significant consistency between both samples in the times, activities, and locations where the presence of others led the greatest and smallest change in state loneliness. This suggests that disparate groups of people may hold similar views regarding how social they should behave across different times, activities, and locations, and this consistency bodes well for my goal of identifying the moments when people are

most likely to feel loneliness when isolated, which should be beneficial for constructing useful social interventions to reduce loneliness. However, future research should assess this consistency further by looking at other demographic factors that may influence social expectations. One important factor may be age. Research consistently finds reduced copresence as people age (Cornwell 2011; Marcum 2013), but debate persists regarding the extent to which this reflects a lack of opportunity or a choice to be alone. Whereas people in middle age often face pressures to be with others (e.g., due to family and work obligations), older people are freer to pursue nonsocial leisure (Marcum 2013). Reduced work and family obligations may translate into reduced expectations for social behavior. This means that although older people are alone more often, being alone may itself be less damaging than it would be for someone younger. Understanding when loneliness will be most damaging for older individuals may benefit from focusing on the extent to which they have the ability to engage with others when they desire to do so. For example, this ability may relate to family connections, friends, geographic proximity, and the technical knowledge necessary to engage with these connections remotely. The role of race and ethnicity is another potentially fruitful area for future research. Expectations for social engagement may vary by culture (Dykstra 2009), and therefore the times, activities, and locations where it is most detrimental to be alone may vary between those of different cultural backgrounds. Although it may be challenging to study race via online samples which are predominately white (Paolacci and Chandler 2014), the data from graduate students offers a unique opportunity to study race due to the large proportion of Asian (26%) and international students (30%) in this dataset. Findings reported in ch.2 show that being Asian or Latino associate with more loneliness, even after accounting for

the presence or absence of others. These relationships may relate to these students being far from home and family, as well as due to the challenges of fitting into a new culture. However, many non-Asian and non-Latino graduate students are also far from home and, presumably, many experience challenges fitting in. The unique challenges faced by Asian and Latino students may relate to cultural differences. These differences may not only include differences for when a person should be social, as I discussed previously, but also different expectations for how often someone should be social. Two graduate students may be equally social, for example, yet one may experience greater loneliness if this student is less social than they had been before entering graduate school. What may alleviate these challenges? Potentially, these challenges may be addressed by supportive mentors and departments, but future research should examine if this is beneficial for avoiding loneliness.

Although there was consistency between graduate students and online participants in what times, activities, and locations associated most and least strongly with state loneliness during social isolation, these were often not the activities and locations I anticipated would exhibit such associations. Two potential issues may explain these findings. First, my measure of social expectation may have been too broad. For example, eating was viewed as not being normatively social, yet people benefit greatly from the presence of others while eating. As I discussed in ch.2, eating likely varies in normative sociality depending on context, with snacking being more private and dinner being more social. Leisure activities may also benefit from further specificity. Finer-grained measures of expectation may therefore produce associations that are more consistent with my hypothesis. Second, some activities and locations may be unique in ways that are

unrelated to social expectations. Work, for example, is a unique activity/location where social engagement is likely to be less voluntary and potentially less beneficial relative to other activities and locations. This unique setting deserves its own focus in future research.

Unlike Study 1, Study 2 produced results that suggest graduate students may be unique in ways that complicate generalizations of their perceptions. This is shown in how engagement with family members benefitted greatly from being active rather than passive, which was similar to the benefit observed among weak ties and unlike the relatively smaller benefit observed among other strong ties, meaning that family members appeared similar to weak ties rather than strong ties. As I indicated in the discussion section in ch.3, this may relate to the sample being at a stage in their lives when they are trying to become more independent from their families. Beyond this, the unique lives of graduate students may also have implications for weak-tie engagement. Relative to those outside of academia, graduate students may encounter a wider number and diversity of weak ties, such as students, as well as a broad social community that is immediately available on campus. Adults with more standard forms of employment may instead have their weak-tie engagement dominated by co-workers. As discussed previously in regard to ch.2, work may be unusual in ways that deserve further attention. For example, the benefit of active over passive engagement may be weaker if the active engagement is involuntary, as it may be for co-workers relative to other weak ties. Similar to work being unique in its relation to loneliness, co-workers may also be unique, therefore future research focusing specifically on loneliness at work should also focus on work-related relationships. Further still, loneliness at work (or while engaging with co-workers) may

relate to work-schedule conflict, in that people may be unhappy at work if the activity displaces time that could be spent with someone more personally important. Understanding loneliness experienced at work will therefore likely benefit from a focus on satisfaction with social engagement occurring during non-working hours.

Although there is a relationship between work-schedule conflict and trait loneliness, it is currently unclear why this relationship exists. I proposed in the discussion in ch.4 that this relationship may be the outcome of participants having experienced such work-schedule conflict over an extended period of time, and that such repeated experiences of state loneliness eventually led some to view themselves as generally lonely. However, an alternative explanation is that trait loneliness may lead people to be dissatisfied with the amount of engagement they received from important others. Rather than work-schedule conflict leading to trait loneliness, trait loneliness may lead to elevated perceptions of work-schedule conflict. However, such reverse causality appears unlikely, since it would presumably also be observed in my measure of work-schedule conflict with friends. And yet, substituting romantic partner schedule conflict with friend schedule conflict does not replicate the findings observed with partners. Still, future research should focus on why the association between partner schedule conflict and trait loneliness exists and the factors that moderate this relationship, such as effective coping mechanisms.

The unexpected findings from my studies highlight areas for future investigation, and findings from these studies also provide avenues toward future research that simultaneously draws from each study—for example, the emphasis on work, co-workers, and work-schedule conflict. Future research should also benefit from the instrument I

developed and employed to collect the time-use data reported in this dissertation. The lack of data on state loneliness relates to the challenges of collecting such data, and my platform opens several opportunities for further studying the momentary experience of daily life. A central example includes the consequences of computer-mediated communication and wellbeing. This topic has received significant attention, but its importance has likely grown dramatically as a consequence of COVID-19. I focused on the distinction between active and passive engagement in this dissertation, but how will the benefits of these forms of engagement over social isolation change when conducted via Zoom or WhatsApp? How will people cope with social distancing, and what factors will contribute to the best and worst outcomes for mental health? Answering these questions requires rapid data collection which my platform makes feasible.

I anticipate COVID-19 will severely impact both daily rates of engagement and the form of this engagement. While the lack of engagement may be the dominate change for many, heightened rates of engagement with certain ties may have wide-ranging outcomes. These will almost certainly include the challenges of increased childcare duties due to restricted access to in-person school and daycare, as well as the potential gender inequality in the enactment of these duties. Increased engagement with romantic partners may lead to conflict for some, culminating in heightened rates of divorce (McKeever 2020). Social distancing may also contribute to heightened domestic violence among those in abusive relationships. Changes in engagement may not be entirely bad, however. As people are forced to become more accustomed with online engagement, the challenges of coordination may diminish. Rather than planning a social gathering for the future (in order to allow people time to travel to and gather at a certain location),

increased online engagement may make others more accessible. For some, momentary feelings of loneliness may therefore be easier to remedy due to others' increased accessibly. This increased accessibility may also heighten expectations to be social, perhaps intensifying the relationships found in ch.2. Alternatively, the difficulty of documenting these social engagements (e.g., by posting pictures of them via social media) may lead to the opposite effect. Future research should examine how these expectations have changed, and the implications of these potential changes for people's wellbeing.

The demographic background of my online samples also hints at fruitful areas for future research. In this dissertation, I recruited participants from Amazon's Mechanical Turk (MTurk) and Prolific Academic (PA). Both platforms have been found to provide high-quality data (Palan and Schitter 2018; Paolacci and Chandler 2014). Although MTurk is more widely used, PA has several advantages and is growing in popularity. Ch.1 highlighted significant demographic differences between these samples, including differences in race, gender, and work status. For example, participants recruited from PA appear more likely to be stay-at-home parents and less likely to be fully employed. These differences are likely to have significant implications for participants' time use. Although research has assessed demographic and data-quality differences between these participant populations, no published research has assessed differences in how they spend their time. The lack of popularity of MTurk samples in sociology may relate to a perception that such participants are unusual in ways that cannot be accounted for via demographics (Shank 2016). Comparing the time use of these participants to nationally representative time-use data may therefore be valuable for understanding whether or not online samples

from either platform are viable for certain kinds of sociological research. Preliminary data on this subject showed MTurk workers to live similar lives to the broader U.S. population, apart from spending more time at home, more time working, and less time engaging in housework (Rinderknecht et al. 2018).

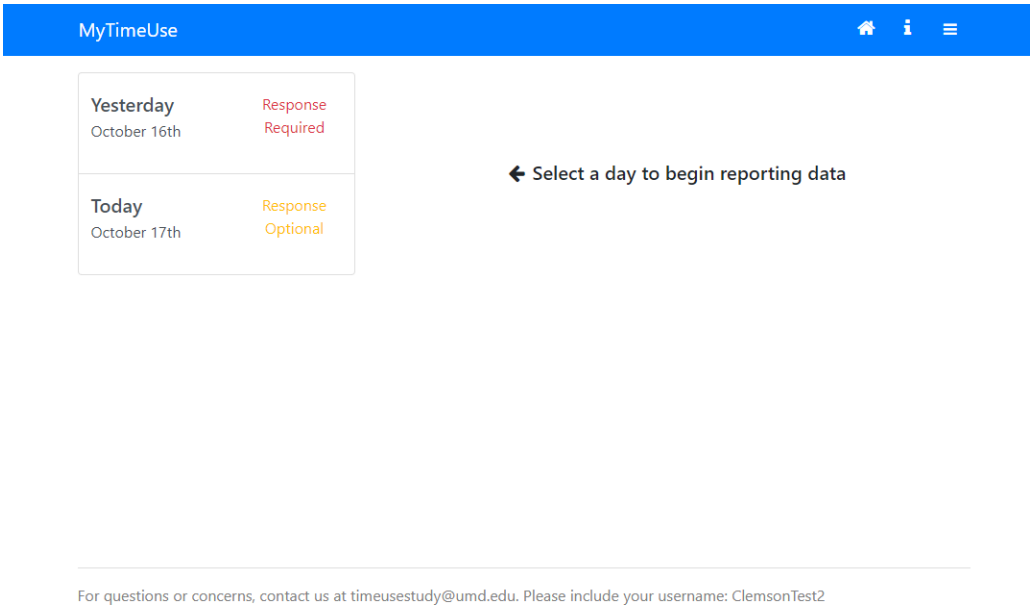
Conclusion

Loneliness can be a significant detriment to mental and physical health (Cacioppo et al. 2011; Hawkley and Cacioppo 2010), yet the difficulty of capturing momentary (i.e. "state") fluctuations in loneliness has limited research on the subject. My methodological advancements allowed me to overcome this challenge. By doing so, I was able to answer my central research question by identifying the factors contributing to state loneliness when alone and with others. I found that expectation, specifically as it relates to time, and engagement are important for understanding loneliness. It is likely that these factors will also be central to understanding the digitization of social life that has been accelerated by COVID-19. The research in this dissertation therefore provides a valuable foundation on which future research can draw from to understand life during and after this pandemic. Beyond this, my research helps answer the broader question grappled with across the literature on loneliness—what makes for a lonely person? While being single, unemployed, and other factors that associate with reduced network size contribute to feeling generally lonely, these factors can be difficult to alter in the short-term. By identifying the momentary sources of loneliness, my research makes short-term intervention feasible by highlighting the kinds of situations people should work hardest to avoid.

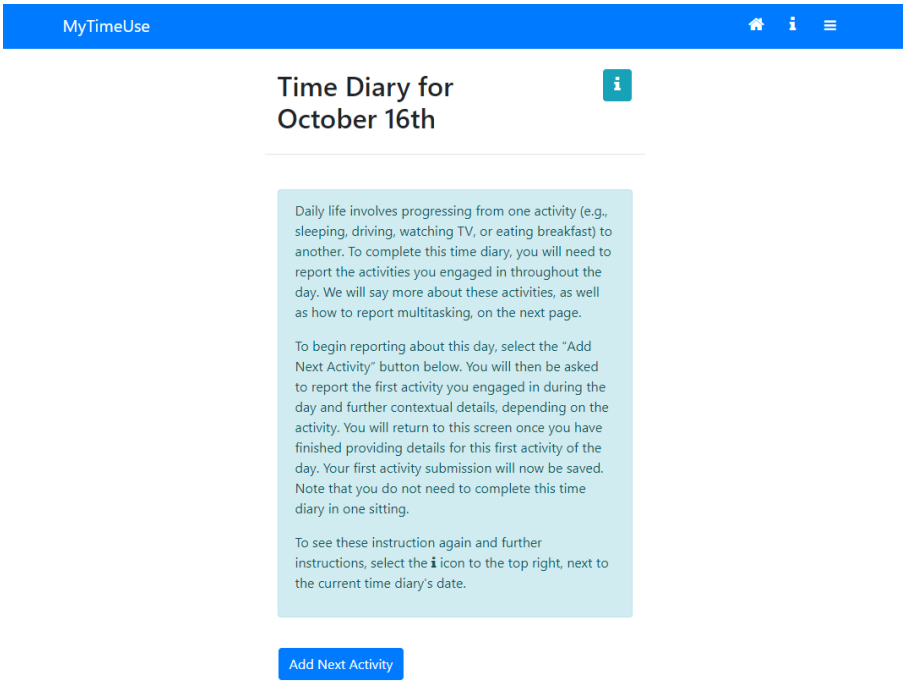
Appendices

Appendix A: Time Diary Instrument Example Submission

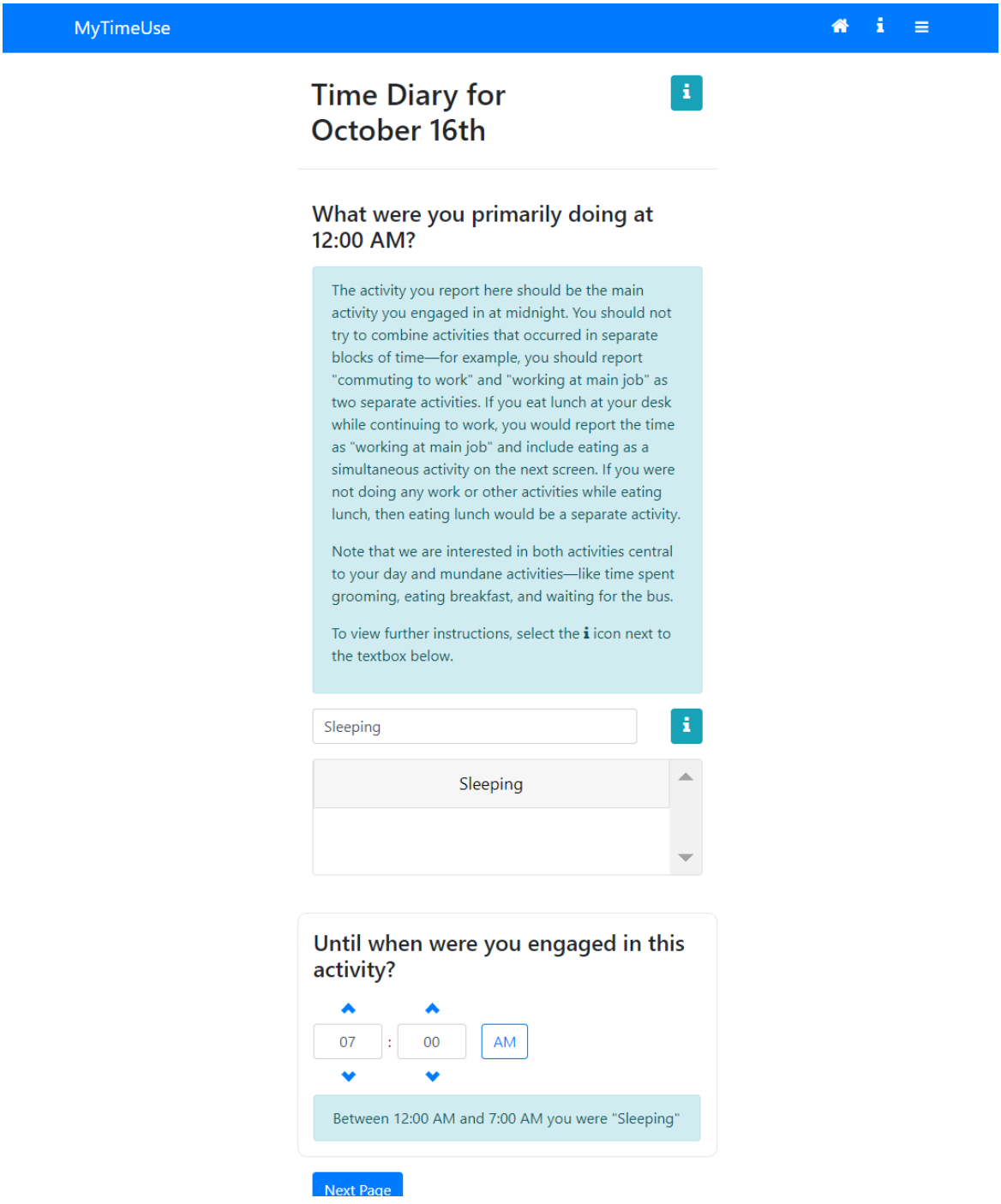
Home page of time diary instrument.



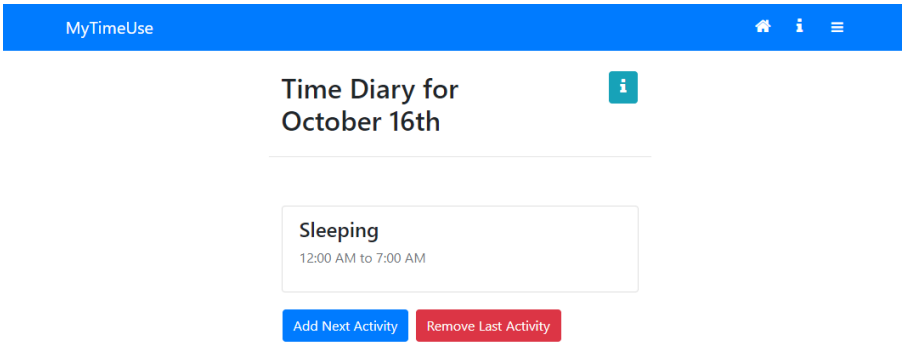
First page of time diary for October 16th.



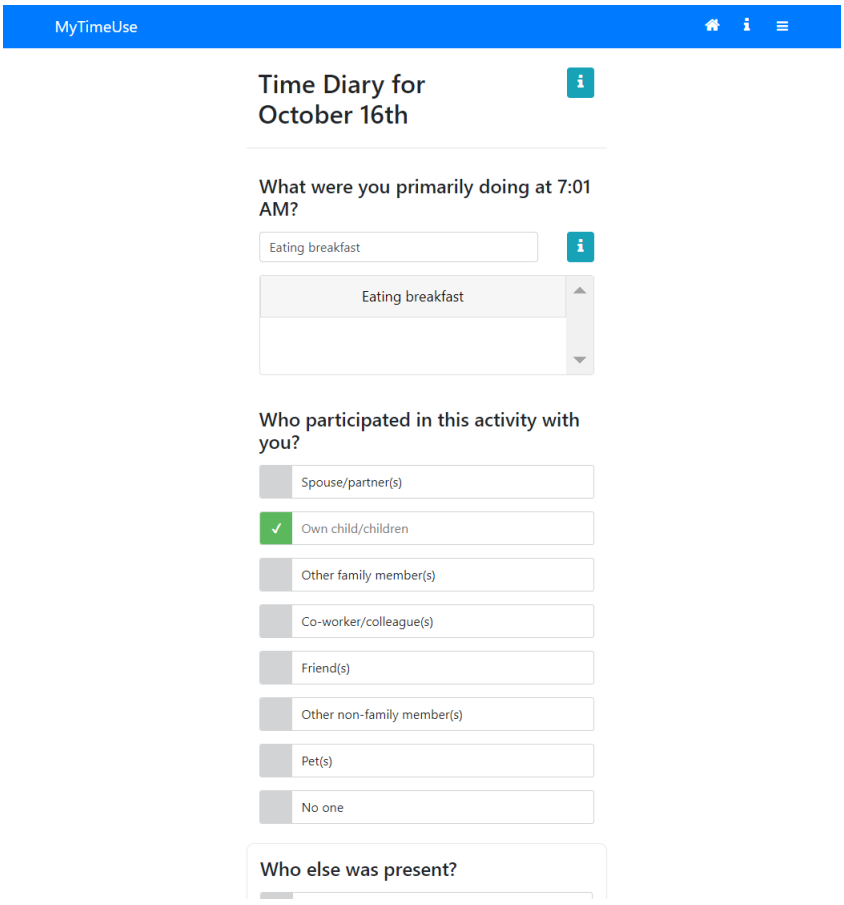
First activity submission. Note: because the participant reported engaging in a form of personal care ("Sleeping") from 12:00AM to 7:00AM, no follow-up questions are asked about this time period.



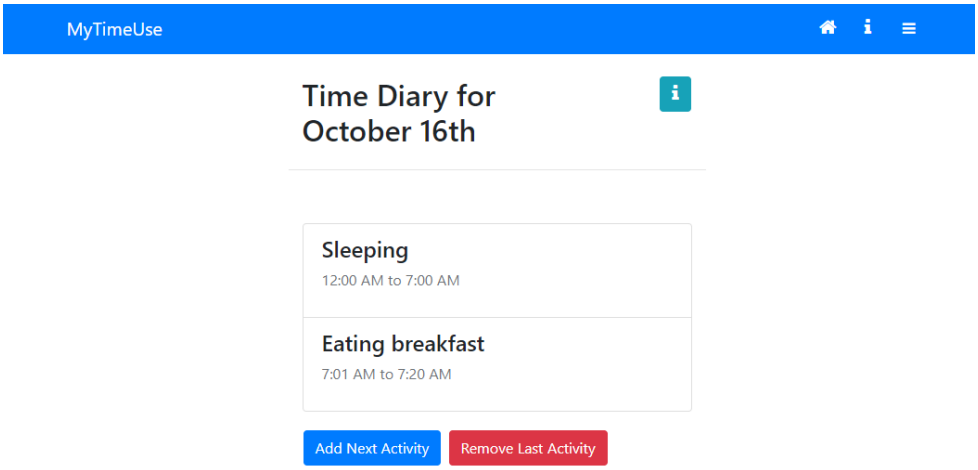
First page of time diary after reporting the first activity.



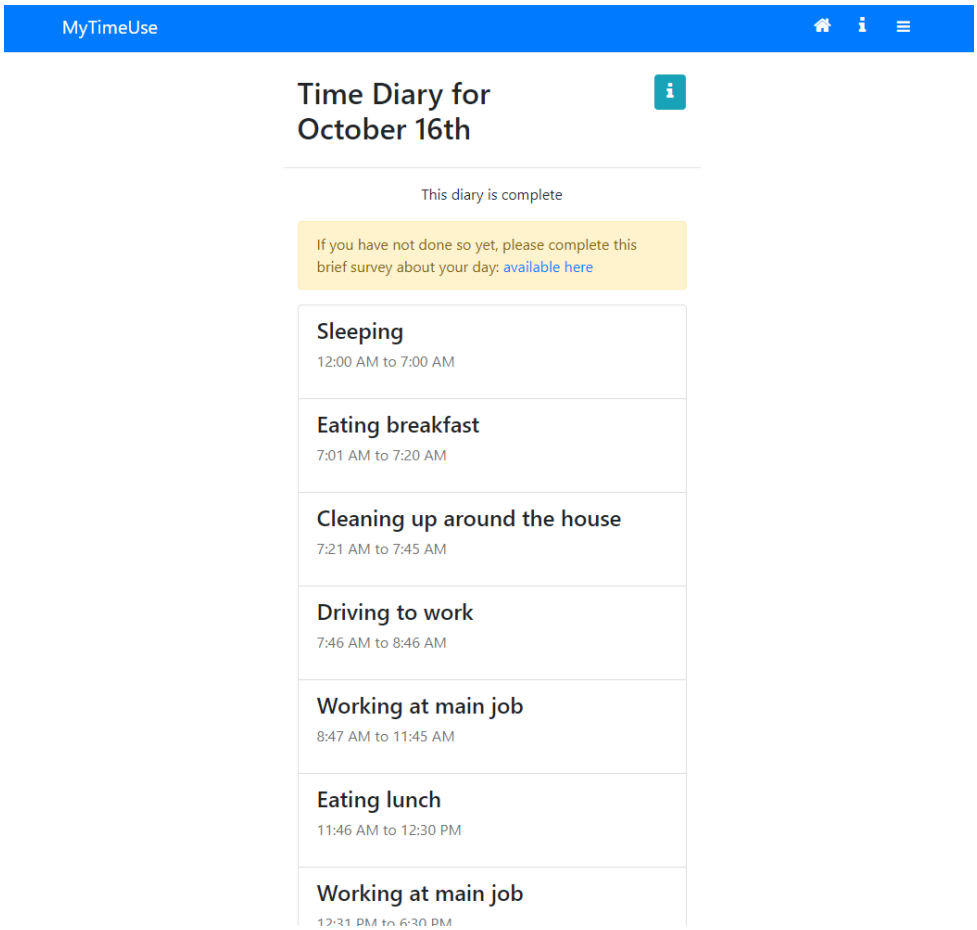
Second activity submission. The participant is reporting "Eating breakfast" starting at 7:01AM. The remainder of this page records who else was present in this time period, the participant's location (e.g., home, work, school), and when the activity ended (in this case, 7:20AM). The next page records secondary activities that occurred between 7:01AM and 7:20AM, and the page following that records perceptions during this time period (e.g., emotions, loneliness).



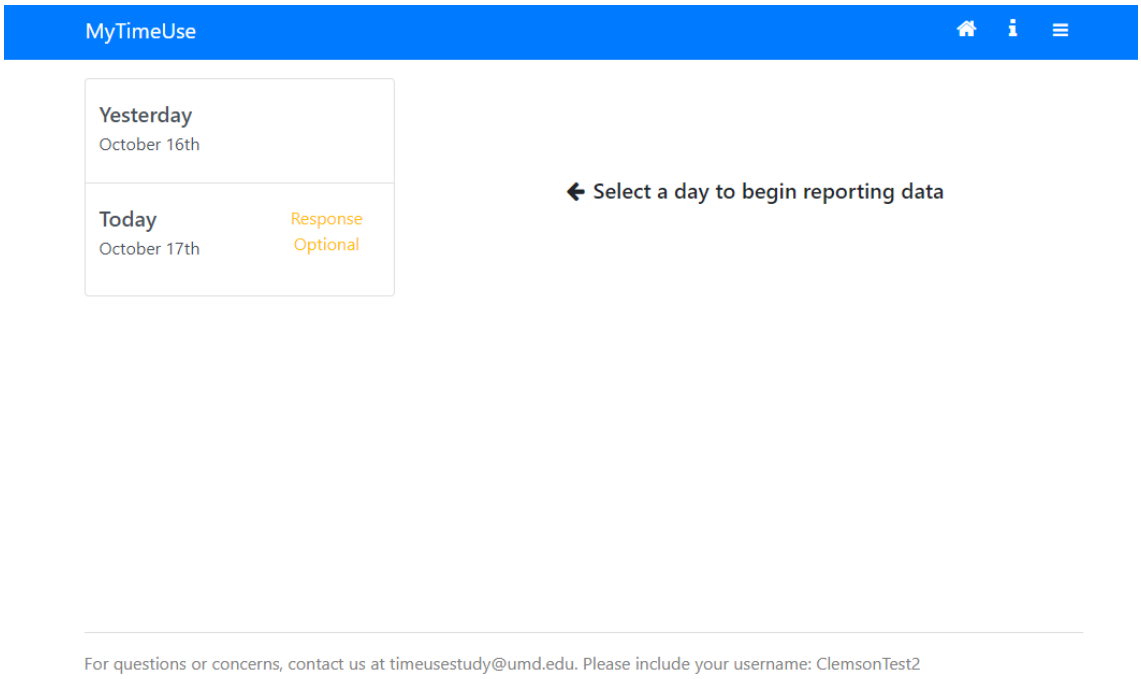
First page of time diary after reporting the second activity.



First page of time diary after reporting the last activity. Note: after reporting on all of October 16th, the participant is prompted to complete a survey asking basic overview questions about the day, including if the day was abnormal in some way.



Home page of time diary instrument after completing time diary for October 16th.
Note: the home page no longer instructs the participant to report data for October 16th.



Appendix B: Supplemental Models

Table S1. Random Intercept Regression Results for Loneliness on Interaction Partners and Form of Engagement with Children as Strongest Tie (N_{level1} = 21,245; N_{level2} = 627)

	Model 1	Model 2	Model 3
Acquaintance	–.332***		
	(.019)		
Friend	–.560***		
	(.026)		
Family	–.447***		
	(.034)		
Spouse/Partner or Children	–.546***		
	(.022)		
Passive Engagement		–.269***	
		(.020)	
Active Engagement		–.524***	
		(.015)	
Acquaintance × Passive Engagement			–.165***
			(.025)
Friend × Passive Engagement			–.471***
			(.069)
Family × Passive Engagement			–.245***
			(.073)
Spouse/Partner/Children × Passive Engagement			–.422***
			(.035)
Acquaintance × Active Engagement			–.463***
			(.024)
Friend × Active Engagement			–.576***
			(.027)
Family × Active Engagement			–.488***
			(.036)
Spouse/Partner/Children × Active Engagement			–.582***
			(.024)
Multiple Partners	.019		.003
	(.026)		(.026)
Traveling	–.046*	–.041	–.046*
	(.023)	(.023)	(.023)
Working	.061**	.069**	.049*
	(.022)	(.021)	(.022)
Housework/Carework	.005	–.009	–.007
	(.024)	(.024)	(.024)
Leisure	–.039	–.028	–.022
	(.025)	(.025)	(.025)
Media	.062*	.039	.049
	(.025)	(.025)	(.025)
Other Activities	–.005	.000	–.005
	(.044)	(.044)	(.044)
Weekend	.032*	.011	.031*
	(.015)	(.014)	(.015)
Constant	2.202***	2.202***	2.200***
	(.226)	(.227)	(.226)
ρ	.490	.492	.492

Note: Alone is the reference category. Standard errors in parentheses. A level 2 random intercept for participant is included to account for clustering. Controls for race, gender, sexuality, age, and round of data collection are included but not shown in the table. * $p < .05$, ** $p < .01$, *** $p < .001$, two-tailed tests.

Table S2. Fixed-Effects Regression Results for Loneliness on Interaction Partners and Form of Engagement (N_{level1} = 21,245; N_{level2} = 627)

	Model 1	Model 2	Model 3
Acquaintance	–.328***		
	(.019)		
Friend	–.555***		
	(.027)		
Family	–.444***		
	(.034)		
Spouse/Partner	–.541***		
	(.022)		
Passive Engagement		–.264***	
		(.020)	
Active Engagement		–.520***	
		(.015)	
Acquaintance × Passive Engagement			–.162***
			(.025)
Friend × Passive Engagement			–.459***
			(.024)
Family × Passive Engagement			–.459***
			(.069)
Spouse/Partner × Passive Engagement			–.571***
			(.028)
Acquaintance × Active Engagement			–.233**
			(.073)
Friend × Active Engagement			–.487***
			(.036)
Family × Active Engagement			–.415***
			(.035)
Spouse/Partner × Active Engagement			–.577***
			(.024)
Multiple Partners	.018		.002
	(.026)		(.026)
Traveling	–.043	–.038	–.043
	(.023)	(.023)	(.023)
Working	.061**	.069**	.049*
	(.022)	(.021)	(.022)
Housework/Carework	.006	–.007	–.006
	(.024)	(.024)	(.024)
Leisure	–.039	–.027	–.021
	(.025)	(.025)	(.025)
Media	.064*	.041	.050*
	(.025)	(.025)	(.025)
Other Activities	–.002	.003	–.002
	(.044)	(.044)	(.044)
Weekend	.032*	.011	.031*
	(.015)	(.014)	(.015)
Constant	–.066***	–.067***	–.067***
	(.018)	(.018)	(.018)
ρ	.521	.523	.523

Note: Alone is the reference category. Standard errors in parentheses. A level 2 random intercept for participant is included to account for clustering. Controls for round of data collection are included but not shown in the table. * $p < .05$, ** $p < .01$, *** $p < .001$, two-tailed tests.

Table S3. Random Intercept Regression Results for Loneliness on Interaction Partners and Form of Engagement with Momentary Assessment of Anger (N_{level1} = 21,245; N_{level2} = 627)

Acquaintance × Passive Engagement	–.166***
	(.025)
Friend × Passive Engagement	–.466***
	(.024)
Family × Passive Engagement	–.477***
	(.068)
Spouse/Partner × Passive Engagement	–.577***
	(.027)
Acquaintance × Active Engagement	–.258***
	(.073)
Friend × Active Engagement	–.490***
	(.036)
Family × Active Engagement	–.419***
	(.035)
Spouse/Partner × Active Engagement	–.580***
	(.023)
Multiple Partners	.008
	(.026)
Momentary Assessment of Anger	.208***
	(.015)
Traveling	–.053*
	(.023)
Working	.043*
	(.022)
Housework/Carework	–.009
	(.024)
Leisure	–.028
	(.025)
Media	.046
	(.025)
Other Activities	–.026
	(.044)
Weekend	.029*
	(.014)
Constant	–.063***
	(.017)
ρ	.493

Note: Alone is the reference category. Standard errors in parentheses. A level 2 random intercept for participant is included to account for clustering. Controls for race, gender, sexuality, age, and round of data collection are included but not shown in the table. * $p < .05$, ** $p < .01$, *** $p < .001$, two-tailed tests.

Table S4. Random Intercept Regression Results for State Loneliness on Schedule Conflict During Engagement with Romantic Partners (N_{level1} = 1,924; N_{level2} = 168)

		Model 1	Model 2	Model 3
Schedule Conflict (w/Friends)		.001	.009	-.016
		(.038)	(.035)	(.032)
Passive Engagement		.162***	.021	.147***
		(.041)	(.044)	(.041)
Work Status				
	Part Time	.187	.173	.062
		(.122)	(.116)	(.106)
	Unemployed	-.104	-.094	.011
		(.171)	(.162)	(.147)
	NIL	.289*	.272*	.232†
		(.141)	(.133)	(.121)
Total Hours		.004	.004	.007*
		(.004)	(.003)	(.003)
Closeness		—	-.091***	—
			(.011)	
Trait Loneliness		—	—	.399***
				(.052)
Constant		1.272***	1.651***	.302
		(.255)	(.245)	(.252)

Note: Standard errors in parentheses. A level 2 random intercept for participant is included to account for clustering. Controls for race, gender, sexuality, age, and marital status are included but not shown in the table. † p < .1, * p < .05, ** p < .01, *** p < .001, two-tailed tests.

References

Abraham, Katharine G., Aaron Maitland, and Suzanne M. Bianchi. 2006. "Nonresponse in the American Time Use Survey." *Public Opinion Quarterly* 70(5):676–703.

Aral, Sinan. 2016. "The Future of Weak Ties." *American Journal of Sociology* 121(6):1931–39.

Arnett, Jeffrey Jensen. 2007. "Socialization in Emerging Adulthood: From the Family to the Wider World, from Socialization to Self-Socialization." Pp. 208–31 in *Handbook of socialization: Theory and research.* New York, NY, US: Guilford Press.

Beck, Alan M., and N. Marshall Meyers. 1996. "Health Enhancement and Companion Animal Ownership." *Annual Review of Public Health* 17:247–57.

Bianchi, Suzanne M., and Melissa A. Milkie. 2010. "Work and Family Research in the First Decade of the 21st Century." *Journal of Marriage and Family* 72(3):705–25.

Bolger, Niall, Anita DeLongis, Ronald C. Kessler, and Elaine Wethington. 1989. "The Contagion of Stress across Multiple Roles." *Journal of Marriage and the Family* 51(1):175.

Buunk, Abraham P., and Frederick X. Gibbons. 2007. "Social Comparison: The End of a Theory and the Emergence of a Field." *Organizational Behavior and Human Decision Processes* 102(1):3–21.

Cacioppo, John T., and Stephanie Cacioppo. 2014. "Social Relationships and Health: The Toxic Effects of Perceived Social Isolation: Social Relationships and Health." *Social and Personality Psychology Compass* 8(2):58–72.

Cacioppo, John T., Stephanie Cacioppo, and Dorret I. Boomsma. 2014. "Evolutionary Mechanisms for Loneliness." *Cognition and Emotion* 28(1):3–21.

Cacioppo, John T., Louise C. Hawkley, L. Elizabeth Crawford, John M. Ernst, Mary H. Burleson, Ray B. Kowalewski, William B. Malarkey, Eve Van Cauter, and Gary G. Berntson. 2002. "Loneliness and Health: Potential Mechanisms:" *Psychosomatic Medicine* 64(3):407–17.

Cacioppo, John T., Louise C. Hawkley, John M. Ernst, Mary Burleson, Gary G. Berntson, Bita Nouriani, and David Spiegel. 2006. "Loneliness within a Nomological Net: An Evolutionary Perspective." *Journal of Research in Personality* 40(6):1054–85.

Cacioppo, John T., Louise C. Hawkley, Greg J. Norman, and Gary G. Berntson. 2011. "Social Isolation: Social Isolation." *Annals of the New York Academy of Sciences* 1231(1):17–22.

Chatzitheochari, Stella, Kimberly Fisher, Emily Gilbert, Lisa Calderwood, Tom Huskinson, Andrew Cleary, and Jonathan Gershuny. 2018. "Using New Technologies for Time Diary Data Collection: Instrument Design and Data Quality Findings from a Mixed-Mode Pilot Survey." *Social Indicators Research* 137(1):379–90.

Cigna, and Ipsos. 2018. "Cigna U.S. Loneliness Index: Survey of 20,000 Americans Examining Behaviors Driving Loneliness in the United States." Retrieved August 22, 2018 (https://www.cigna.com/newsroom/news-releases/2018/new-cigna-study-reveals-loneliness-at-epidemic-levels-in-america).

Collins, Andrew, and Manfred van Dulmen. 2006. "Friendships and Romance in Emerging Adulthood: Assessing Distinctiveness in Close Relationships." Pp. 219–34 in *Emerging adults in America: Coming of age in the 21st century.* Washington, DC, US: American Psychological Association.

Cooley, Charles Horton. 1983. *Human Nature and the Social Order*. Hardpress Publishing.

Cornwell, Benjamin. 2011. "Age Trends in Daily Social Contact Patterns." *Research on Aging* 33(5):598–631.

Craig, Lyn, and Judith E. Brown. 2015. "Nonstandard Employment and Nonwork Activities, Time Alone and with Others: Can Weekend Workers Make up Lost Time?" *Journal of Industrial Relations* 57(1):3–23.

Deri, Sebastian, Shai Davidai, and Thomas Gilovich. 2017. "Home Alone: Why People Believe Others' Social Lives Are Richer than Their Own." *Journal of Personality and Social Psychology* 113(6):858–77.

Dix, Katherine L. 2007. "Faculty Perspectives Regarding Graduate International Students' Isolation from Host National Students." *International Education Journal* 8(1):108–17.

Doan, Long, R. Gordon Rinderknecht, Liana C. Sayer, and Grant D. McKenzie. 2017."A New Smartphone Application for Examining the Emotions in Social Interactions," 29th Annual Group Processes Conference.

Durlauf, Steven N. 2002. "Bowling Alone: A Review Essay." *Journal of Economic Behavior & Organization* 259–73.

Dykstra, Pearl A. 2009. "Older Adult Loneliness: Myths and Realities." *European Journal of Ageing* 6(2):91–100.

Feld, Scott L. 1991. “Why Your Friends Have More Friends Than You Do.” *American Journal of Sociology* 96(6):1464–77.

Fenwick, Rudy, and Mark Tausig. 2001. “Scheduling Stress: Family and Health Outcomes of Shift Work and Schedule Control.” *American Behavioral Scientist* 44(7):1179–98.

Festinger, Leon. 1954. “A Theory of Social Comparison Processes.” *Human Relations* 7(2):117–40.

Fischer, Claude S. 2009. “The 2004 GSS Finding of Shrunken Social Networks: An Artifact?” *American Sociological Review* 74(4):657–69.

Flood, Sarah M., Katie R. Genadek, and Phyllis Moen. 2018. “Does Marital Quality Predict Togetherness? Couples’ Shared Time and Happiness During Encore Adulthood.” *Minnesota Population Center Working Paper Series* 1–38.

Ford, Michael T., Beth A. Heinen, and Krista L. Langkamer. 2007. “Work and Family Satisfaction and Conflict: A Meta-Analysis of Cross-Domain Relations.” *Journal of Applied Psychology* 92(1):57–80.

Gable, Shelly L., and Courtney L. Gosnell. 2013. “Approach and Avoidance Behavior in Interpersonal Relationships.” *Emotion Review* 5(3):269–74.

Glorieux, Ignace, and Joeri Minnen. 2009. “How Many Days? A Comparison of the Quality of Time-Use Data from 2-Day and 7-Day Diaries.” *Electronic International Journal of Time Use Research* 6(2):314–27.

Granovetter, Mark. 1983. “The Strength of Weak Ties: A Network Theory Revisited.” *Sociological Theory* 1:201.

Grossman, Arnold H., Anthony R. D’augelli, and Timothy S. O’connell. 2001. “Being Lesbian, Gay, Bisexual, and 60 or Older in North America.” *Journal of Gay & Lesbian Social Services* 13(4):23–40.

Hawkley, L. C., M. W. Browne, and J. T. Cacioppo. 2005. “How Can I Connect With Thee?: Let Me Count the Ways.” *Psychological Science* 16(10):798–804.

Hawkley, Louise C., and John T. Cacioppo. 2010. “Loneliness Matters: A Theoretical and Empirical Review of Consequences and Mechanisms.” *Annals of Behavioral Medicine* 40(2):218–27.

Hawkley, Louise C., Mary E. Hughes, Linda J. Waite, Christopher M. Masi, Ronald A. Thisted, and John T. Cacioppo. 2008. “From Social Structural Factors to Perceptions of Relationship Quality and Loneliness: The Chicago Health, Aging, and Social Relations Study.” *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 63(6):375–84.

Hawkley, Louise. C., Kristopher J. Preacher, and John T. Cacioppo. 2007. “Multilevel Modeling of Social Interactions and Mood in Lonely and Socially Connected Individuals.” Pp. 559–75 in *The Oxford Handbook of Methods in Positive Psychology*, edited by A. D. Ong and M. H. M. van Dulmen. New York, NY: Oxford University Press.

Hefner, Jennifer, and Daniel Eisenberg. 2009. “Social Support and Mental Health among College Students.” *American Journal of Orthopsychiatry* 79(4):491–99.

Heise, David R. 1987. “Affect Control Theory: Concepts and Model.” *The Journal of Mathematical Sociology* 13(1–2):1–33.

House, James, Karl L. Landis, and Debra Umberson. 1988. “Social Relationships and Health.” *Science* 241(4865):540–45.

Hua Wang, and Barry Wellman. 2010. “Social Connectivity in America: Changes in Adult Friendship Network Size From 2002 to 2007.” *American Behavioral Scientist* 53(8):1148–69.

Hyun, Jenny K., Brian C. Quinn, Temina Madon, and Steve Lustig. 2006. “Graduate Student Mental Health: Needs Assessment and Utilization of Counseling Services.” *Journal of College Student Development* 47(3):247–66.

Jamal, Muhammed. 2004. “Burnout, Stress and Health of Employees on Non-Standard Work Schedules: A Study of Canadian Workers.” *Stress and Health* 20(3):113–19.

Kahneman, Daniel, Alan B. Krueger, David A. Schkade, Norbert Schwarz, and Arthur A. Stone. 2004. “A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method.” *Science* 306(5702):1776–80.

Kalil, Ariel, Kathleen M. Ziol-Guest, and Jodie Levin Epstein. 2010. “Nonstandard Work and Marital Instability: Evidence From the National Longitudinal Survey of Youth.” *Journal of Marriage and Family* 72(5):1289–1300.

Keith, Pat M. 1986. “The Social Context and Resources of the Unmarried in Old Age.” *The International Journal of Aging and Human Development* 23(2):81–96.

Klinenberg, Eric. 2013. *Going Solo: The Extraordinary Rise and Surprising Appeal of Living Alone*. New York: Penguin Books.

Lavee, Yoav, and Adital Ben-Ari. 2007. “Relationship of Dyadic Closeness With Work-Related Stress: A Daily Diary Study.” *Journal of Marriage and Family* 69(4):1021–35.

Lawler, Edward J. 2001. “An Affect Theory of Social Exchange.” *American Journal of Sociology* 107(2):321–52.

Levin, Daniel Z., and Rob Cross. 2004. “The Strength of Weak Ties You Can Trust: The Mediating Role of Trust in Effective Knowledge Transfer.” *Management Science* 50(11):1477–90.

Luanaigh, Conor Ó., and Brian A. Lawlor. 2008. “Loneliness and the Health of Older People.” *International Journal of Geriatric Psychiatry* 23(12):1213–21.

Marcum, Christopher Steven. 2013. “Age Differences in Daily Social Activities.” *Research on Aging* 35(5):612–40.

Matthews, Lisa S., Rand D. Conger, and K. A. S. Wickrama. 1996. “Work-Family Conflict and Marital Quality: Mediating Processes.” *Social Psychology Quarterly* 59(1):62.

McKeever, Vicky. 2020. “As Couples Self-Isolated Due to Coronavirus, Lawyers Expect a Rise in Divorces.” Retrieved (https://www.cnbc.com/2020/03/25/coronavirus-lawyers-expect-a-rise-in-divorces-after-self-isolation.html).

McPherson, Miller, Lynn Smith-Lovin, and Matthew E. Brashears. 2006. “Social Isolation in America: Changes in Core Discussion Networks over Two Decades.” 353–75.

Mead, George Herbert. 1934. *Mind, Self, and Society*. Chicago ; London: University of Chicago Press.

Merton, Robert King. 2000. *Social Theory and Social Structure*. Enlarged ed., [Nachdr.]. New York, NY: Free Press.

Milkie, Melissa A., Catharine H. Warner, and Rashawn Ray. 2014. “Current Theorizing and Future Directions in the Social Psychology of Social Class Inequalities.” Pp. 547–73 in *Handbook of the Social Psychology of Inequality, Handbooks of Sociology and Social Research*, edited by J. D. McLeod, E. J. Lawler, and M. Schwalbe. Dordrecht: Springer Netherlands.

Mills, Melinda, and Kadri Täht. 2010. “Nonstandard Work Schedules and Partnership Quality: Quantitative and Qualitative Findings.” *Journal of Marriage and Family* 72(4):860–75.

Myers-Walls, Judith A., Larissa V. Frias, Kyong-Ah Kwon, Mei-Ju Meryl Ko, and Ting Lu. 2011. “Living Life in Two Worlds: Acculturative Stress among Asian International Graduate Student Parents and Spouses.” *Journal of Comparative Family Studies* 42(4):455–78.

Neff, Lisa A., and Benjamin R. Karney. 2004. “How Does Context Affect Intimate Relationships? Linking External Stress and Cognitive Processes within Marriage.” *Personality and Social Psychology Bulletin* 30(2):134–48.

Palan, Stefan, and Christian Schitter. 2018. “Prolific.Ac—A Subject Pool for Online Experiments.” *Journal of Behavioral and Experimental Finance* 17:22–27.

Paolacci, Gabriele, and Jesse Chandler. 2014. “Inside the Turk: Understanding Mechanical Turk as a Participant Pool.” *Current Directions in Psychological Science* 23(3):184–88.

Parigi, Paolo, and Warner Henson. 2014. “Social Isolation in America.” *Annual Review of Sociology* 40(1):153–71.

Peer, Eyal, Laura Brandimarte, Sonam Samat, and Alessandro Acquisti. 2017. “Beyond the Turk: Alternative Platforms for Crowdsourcing Behavioral Research.” *Journal of Experimental Social Psychology* 70:153–63.

Pejovic, Veljko, Neal Lathia, Cecilia Mascolo, and Mirco Musolesi. 2015. “Mobile-Based Experience Sampling for Behaviour Research.” *ArXiv:1508.03725 [Cs]*.

Peplau, L. A., and D. Perlman. 1982. “Perspectives on Loneliness.” Pp. 1–18 in *Loneliness: A Sourcebook of Current Theory, Research and Therapy*, edited by L. A. Peplau and D. Perlman. New York, NY: Wiley-Interscience.

Peplau, Letitia Anne, Maria Miceli, and Bruce Morasch. 1982. “Loneliness and Self-Evaluation.” Pp. 135–51 in *Loneliness: A Sourcebook of Current Theory, Research and Therapy*, edited by L. A. Peplau and D. Perlman. New York, NY: Wiley-Interscience.

Pérez-Asenjo, Eduardo. 2011. “If Happiness Is Relative, against Whom Do We Compare Ourselves? Implications for Labour Supply.” *Journal of Population Economics* 24(4):1411–42.

Putnam, Robert D. 2001. *Bowling Alone: The Collapse and Revival of American Community*. 1. touchstone ed. New York, NY: Simon & Schuster.

Qualter, Pamela, Janne Vanhalst, Rebecca Harris, Eeske Van Roekel, Gerine Lodder, Munirah Bangee, Marlies Maes, and Maaike Verhagen. 2015. “Loneliness Across the Life Span.” *Perspectives on Psychological Science* 10(2):250–64.

Queen, Tara L., Robert S. Stawski, Lindsay H. Ryan, and Jacqui Smith. 2014. “Loneliness in a Day: Activity Engagement, Time Alone, and Experienced Emotions.” *Psychology and Aging* 29(2):297–305.

Reis, Harry T., Kennon M. Sheldon, Shelly L. Gable, Joseph Roscoe, and Richard M. Ryan. 2000. “Daily Well-Being: The Role of Autonomy, Competence, and Relatedness.” *Personality and Social Psychology Bulletin* 26(4):419–35.

Reissmann, Andreas, Joachim Hauser, Ewelina Stollberg, Ivo Kaunzinger, and Klaus W. Lange. 2018. “The Role of Loneliness in Emerging Adults’ Everyday Use of

Facebook – An Experience Sampling Approach." *Computers in Human Behavior* 88:47–60.

Rinderknecht, R. Gordon, Long Doan, and Liana C. Sayer. 2018."The Lives of MTurkers: A Time Diary Study of the Mechanical Turk Workforce," Time Use Across the Life Course Conference.

van Roekel, Eeske, Ron H. J. Scholte, Rutger C. M. E. Engels, Luc Goossens, and Maaike Verhagen. 2015. "Loneliness in the Daily Lives of Adolescents: An Experience Sampling Study Examining the Effects of Social Contexts." *The Journal of Early Adolescence* 35(7):905–30.

van Roekel, Eeske, Ron H. J. Scholte, Rutger C. M. E. Engels, Luc Goossens, and Maaike Verhagen. 2016. "Loneliness in the Daily Lives of Adolescents: An Experience Sampling Study Examining the Effects of Social Contexts." *The Journal of Early Adolescence* 35(7):905–30.

van Roekel, Eeske, Maaike Verhagen, Rutger C. M. E. Engels, Ron H. J. Scholte, Stephanie Cacioppo, and John T. Cacioppo. 2018. "Trait and State Levels of Loneliness in Early and Late Adolescents: Examining the Differential Reactivity Hypothesis." *Journal of Clinical Child & Adolescent Psychology* 47(6):888–99.

Rosenberg, Morris, and Leonard I. Pearlin. 1978. "Social Class and Self-Esteem Among Children and Adults." *American Journal of Sociology* 84(1):53–77.

Rummell, Christina M. 2015. "An Exploratory Study of Psychology Graduate Student Workload, Health, and Program Satisfaction." *Professional Psychology: Research and Practice* 46(6):391–99.

Russell, Dan, Letitia A. Peplau, and Carolyn E. Cutrona. 1980. "The Revised UCLA Loneliness Scale: Concurrent and Discriminant Validity Evidence." *Journal of Personality and Social Psychology* 39(3):472–80.

Russell, Daniel W. 1996. "UCLA Loneliness Scale (Version 3): Reliability, Validity, and Factor Structure." *Journal of Personality Assessment* 66(1):20–40.

Sandstrom, Gillian M., and Elizabeth W. Dunn. 2014. "Social Interactions and Well-Being: The Surprising Power of Weak Ties." *Personality and Social Psychology Bulletin* 40(7):910–22.

Savikko, N., P. Routasalo, R. S. Tilvis, T. E. Strandberg, and K. H. Pitkälä. 2005. "Predictors and Subjective Causes of Loneliness in an Aged Population." *Archives of Gerontology and Geriatrics* 41(3):223–33.

Shaffer, Margaret A., Janice R. W. Joplin, and Yu-Shan Hsu. 2011. "Expanding the Boundaries of Work—Family Research: A Review and Agenda for Future Research." *International Journal of Cross Cultural Management* 11(2):221–68.

Shank, Daniel B. 2016. “Using Crowdsourcing Websites for Sociological Research: The Case of Amazon Mechanical Turk.” *The American Sociologist* 47(1):47–55.

Sherry, Mark, Peter Thomas, and Wing Hong Chui. 2010. “International Students: A Vulnerable Student Population.” *Higher Education* 60(1):33–46.

Shiovitz-Ezra, Sharon, and Liat Ayalon. 2010. “Situational versus Chronic Loneliness as Risk Factors for All-Cause Mortality.” *International Psychogeriatrics* 22(03):455–62.

Strahan, Erin J., Anne E. Wilson, Kate E. Cressman, and Vanessa M. Buote. 2006. “Comparing to Perfection: How Cultural Norms for Appearance Affect Social Comparisons and Self-Image.” *Body Image* 3(3):211–27.

Suls, Jerry, René Martin, and Ladd Wheeler. 2002. “Social Comparison: Why, With Whom, and With What Effect?” *Current Directions in Psychological Science* 11(5):159–63.

Tam, Katy Y. Y., and Christian S. Chan. 2019. “The Effects of Lack of Meaning on Trait and State Loneliness: Correlational and Experience-Sampling Evidence.” *Personality and Individual Differences* 141:76–80.

Thoits, Peggy A. 1995. “Social Psychology: The Interplay between Sociology and Psychology.” *Social Forces* 73(4):1231.

Thoits, Peggy A. 2011. “Mechanisms Linking Social Ties and Support to Physical and Mental Health.” *Journal of Health and Social Behavior* 52(2):145–61.

Thoits, Peggy A., and Lauren K. Virshup. 1997. “Me’s and We’s: Forms and Functions of Social Identities.” Pp. 106–33 in *Self and Identity: Fundamental Issues*. Vol. 1, edited by R. D. Ashmore and L. Jussim. Oxford: Oxford University Press.

Twenge, Jean M., Gabrielle N. Martin, and W. Keith Campbell. 2018. “Decreases in Psychological Well-Being among American Adolescents after 2012 and Links to Screen Time during the Rise of Smartphone Technology.” *Emotion* 18(6):765–80.

U.S. Bureau of Labor Statistics and U.S. Census Bureau. 2016. “American Time Use Survey Lexicon 2016.”

Walen, Heather R., and Margie E. Lachman. 2000. “Social Support and Strain from Partner, Family, and Friends: Costs and Benefits for Men and Women in Adulthood.” *Journal of Social and Personal Relationships* 17(1):5–30.

Watson, David, Lee Anna Clark, Curtis W. Mclntyre, and Stacy Hamaker. 1992. “Affect, Personality, and Social Activity.” *Journal of Personality and Social Psychology* 63(6):1011–25.

Wellman, Barry, and Scot Wortley. 1990. “Different Strokes from Different Folks: Community Ties and Social Support.” *American Journal of Sociology* 96(3):558–88.

Westefeld, John S., Michael R. Maples, Brian Buford, and Steve Taylor. 2001. “Gay, Lesbian, and Bisexual College Students: The Relationship Between Sexual Orientation and Depression, Loneliness, and Suicide.” *Journal of College Student Psychotherapy* 15(3):71–82.

White, Lynn, and Bruce Keith. 1990. “The Effect of Shift Work on the Quality and Stability of Marital Relations.” *Journal of Marriage and the Family* 52(2):453.

Wiese, Christopher W., Lauren Kuykendall, and Louis Tay. 2018. “Get Active? A Meta-Analysis of Leisure-Time Physical Activity and Subjective Well-Being.” *The Journal of Positive Psychology* 13(1):57–66.

van Winkel, Mark, Marieke Wichers, Dina Collip, Nele Jacobs, Catherine Derom, Evert Thiery, Inez Myin-Germeys, and Frenk Peeters. 2017. “Unraveling the Role of Loneliness in Depression: The Relationship Between Daily Life Experience and Behavior.” *Psychiatry* 80(2):104–17.

Yang, Raymond K., Steven R. Byers, Guadalupe Salazar, and Richard A. Salas. 2009. “Cultural Adaptation to a University Campus: The Case of Latino Students.” *Journal of Hispanic Higher Education* 8(2):115–29.

Young, Cristobal, and Chaeyoon Lim. 2014. “Time as a Network Good: Evidence from Unemployment and the Standard Workweek.” *Sociological Science* 10–27.

Zavaleta, Diego, Kim Samuel, and China T. Mills. 2017. “Measures of Social Isolation.” *Social Indicators Research* 131(1):367–91.