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Article

Loneliness Loves Company, Some More than Others: Social Ties, Form of Engagement, and Their Relation to Loneliness

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ABSTRACT

Although tie strength is a significant theoretical concept in the field, recent work suggests that other dimensions of social ties may be important to consider. We build on this body of work to propose that situational forms of engagement with various interaction partners play a vital role in shaping feelings of loneliness. We anticipate that when engaging in direct forms of engagement (active engagement), the association between different types of social ties and loneliness will be minimal. In contrast, while engaging in less direct forms of engagement (passive engagement), the type of social tie may matter more in reducing loneliness. We test these expectations using original time-diary data capturing daily interactions and momentary feelings of loneliness. Results show that active engagement associates with reduced feelings of loneliness relative to passive engagement. We find that the benefit of active engagement over passive engagement is greatest among acquaintances and family members. We interpret this as indicating that active engagement is beneficial for establishing a sense of connection among some social ties that already exists for other social ties. These findings indicate that how we engage with others and the kinds of people we engage with jointly shape the benefits of social interaction.

KEYWORDS: loneliness; social isolation; social interaction; time use; social ties.

As a social problem, social isolation garners significant attention across the social sciences, where a broad literature debates its changing scope, causes, and consequences (Brashears 2011; Cacioppo and Cacioppo 2014; Cacioppo et al. 2011; Heinrich and Gullone 2006; House, Landis, and Umberson 1988; Parigi and Henson 2014). Loneliness, the subjective perception of social isolation, has been found to be especially detrimental to mental and physical health (Cacioppo and Cacioppo

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2014; Cacioppo et al. 2011). Loneliness arises from a mismatch between desired and experienced social engagement (Peplau, Miceli, and Morasch 1982). Research often seeks to understand the origins of this mismatch by focusing on a lack of engagement with close ties such as friends and family (Hawkley et al. 2008; Shiovitz-Ezra and Leitsch 2010). Yet, other forms of social connection are often available in people's daily lives (e.g., coworkers while at work, classmates while in school) and therefore may be instrumental for combating the momentary experience of loneliness.

Consistent with the literature's focus on close ties over other ties, a common approach in distinguishing close ties with more ephemeral ones build on Granovetter's (1973) work on tie strength. However, the meaning and function of close ties such as friends have changed drastically throughout history (Silver 1989). Although tie strength remains a key concept in the social network literature, more recent work demonstrates the "weakness of tie strength" in confidante networks and information flow through social networks (Brashears and Quintane 2018). Others have pushed for a rethinking of tie strength altogether toward an understanding of the characteristics of the interaction space, tie availability, and empathy (Small 2017). Indeed, symbolic interactionists have long called for more careful consideration of the meanings associated with social ties rather than treating structurally similar ties as interchangeable (Fine and Kleinman 1983). Small's "networks in practice" approach argues that interactional context, social institutions, and multiple forms of decision-making processes shape who people confide in as much as features of network structures and tie strength.

The present article contributes to this literature by highlighting the situational features of social interactions that shape experiences of loneliness. In doing so, we bridge the literature, pushing beyond tie strength with the literature on the momentary experience of loneliness (e.g., van Roekel et al. 2018; Tam and Chan 2019; van Winkel et al. 2017). This research captures feelings of loneliness at multiple times during a day, either as they occur or near the time of their occurrence. This approach is valuable for both revealing that approximately half the variance in reported loneliness occurs within participants (Tam and Chan 2019) and by being uniquely well-suited for understanding the forces that shape this within-participant variance. Drawing on insights from the networks in practice approach, we distinguish between shared engagement in an activity (which we call *active engagement*), and more passive forms of engagement, such as mere co-presence (which we call *passive engagement*). How people engage with others is important because active engagement may act as a way to increase tie strength within a situation. Taking this approach decenters tie strength inferred from tie type as a central focus in the loneliness literature and moves it toward asking important questions about the role of engagement with others.

Although it may be valuable to better understand the main effect of engagement form on loneliness, we anticipate form of engagement will interact with the type of social tie because different types of ties carry different capacities for bandwidth, frequency of interaction, redundancy with one another (Brashears and Quintane 2018), and feelings of closeness (Small 2017). Imagine, for example, 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. This may be because co-presence with intimate ties reinforces shared dyadic identities (e.g., spouses, family, friends) in a way that co-presence with non-intimate ties do not. At the same time, the difference in experienced loneliness may be similarly low, regardless of whom we interact with, be they friends, family, romantic partners, or acquaintances, if they are engaged with directly.

We focus on momentary loneliness because we want to know how people's decisions in a situation (i.e., whom they engage with and how) have immediate consequences for their wellbeing in that moment. For some, these feelings will be part of a persistent pattern of loneliness (i.e., "trait" loneliness), which research shows is associated with worsened physical and mental health (Hawkley and Cacioppo 2010). This is to say that momentary loneliness and trait loneliness are closely linked, which van Winkel et al. (2017) illustrate in their operationalizations of both factors. This study

prompted participants to report their momentary feelings of loneliness multiple times a day for five consecutive days, and they operationalized trait loneliness as the mean value of each participant's momentary loneliness responses. This shows how momentary loneliness is a constituent part of trait loneliness, and research highlighting the damaging effects of trait loneliness therefore also speaks to the importance of momentary loneliness.[1]

In the sections that follow, we discuss the effects that relationship type and social engagement are likely to have on loneliness. Next, we propose how these factors may have an interactive effect on loneliness. We then test these expectations using original data from 1,876 24-hour retrospective time-diaries collected from a sample of 627 graduate students at a large public Mid-Atlantic university (Sayer, Doan, and Rinderknecht 2019). We end by discussing these results and how our approach may be useful to future research.

BACKGROUND

Types of Social Ties and Loneliness

Whom individuals interact with has been a topic of much research, especially in social network studies (Marsden and Campbell 2012). Perhaps one of the most impactful distinctions arising from this line of work is between so-called "weak" versus "strong" ties (Granovetter 1973). Whereas strong ties are often a source of social and emotional support (Granovetter 1983), weak ties serve important roles in introducing local networks to new knowledge (Aral 2016; Levin and Cross 2004), but they are typically seen as a relatively less useful source of emotional support and wellbeing (Thoits 2011; Wellman and Wortley 1990). Outside of social network research, studies of momentary loneliness and wellbeing often focus on tie strength with analogous concepts that assume different levels of intimacy with different kinds of interaction partners. For example, van Roekel et al. (2018) categorizes intimate company as friends, family, and (in studies of non-adolescents) significant others, while categorizing other ties (e.g., roommates, classmates) as non-intimate. Here, too, weak ties are identified as being less beneficial than strong ties.[2]

There are notable distinctions among strong ties and inconsistencies between strong and weak ties that complicate the reduction of people's social lives to a strong versus weak dichotomy. Friends are typically viewed as chosen and voluntary, whereas family are given and viewed as requiring commitment. These divisions can blur in everyday life (Pahl and Spencer 2004)—though, consistent with these divisions, "difficult" ties appear more likely to be family than friends (Offer and Fischer 2018). The distinction between friends and acquaintances is clearer. Friendship is an achievement indicative of positive relationship quality and trust; to be a friend is to be more than an acquaintance (Pahl and Spencer 2004; Silver 1989). Yet, acquaintances and more distant ties at times take on roles often assumed to characterize stronger ties (Bearman and Parigi 2004; Small 2013, 2017; Small and Sukhu 2016), and vice versa (Aral and Van Alstyne 2011; Desmond 2012). Further, the nature of social ties has been shown to be influenced by network cultures and by how groups define interaction styles (Yeung 2005). In light of the difficulty in assuming that tie strength and tie type go hand in hand, we separately examine different types of ties in our analyses—spouses/partners, family, friends, and acquaintances—and how interactions with them differentially impact loneliness. In the next section, we introduce a factor that we propose may alter the nature of ties in the moment: form of engagement. Consistent with newer work highlighting the contextual nature of social ties, we expect that form of engagement is a key factor shaping people's feelings of closeness to others and thus their loneliness in various situations.

1 Supplemental analyses also show that trait loneliness is correlated with the experience of momentary loneliness in our models. This further illustrates that general feelings of loneliness captured by trait loneliness are related to heightened momentary loneliness throughout daily life and vice-versa.

2 Intimate and non-intimate ties are analogous to strong and weak ties, respectively.

Engagement Form and Loneliness

Social engagement is predominantly estimated through surveys that gauge participants' average degree of social engagement over a broad or unspecified timescale, or by measures from which a general picture of participants' social engagement can be captured, such as a count of participants' friends, confidants, or the presence of a spouse (Wang and Wellman 2010; Zavaleta, Samuel, and Mills 2017). *How* people interact with others may be perceived to be too inconsequential by researchers to capture via such measures (sometimes referred to as "stylized measures" (Kan and Pudney 2008)), or people may forget such information too quickly to be reliably measured via such measures. Perhaps as a consequence, we are unaware of any studies that capture how people interact with others via stylized 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 loneliness. For example, when measuring a particular moment in time, researchers typically ask participants whether they were "alone" (Tam and Chan 2019), "alone or with company" (van Roekel et al. 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, we 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 engaging in a shared activity. For example, active engagement with a partner may include folding laundry together, while passive engagement with a partner may include one partner folding laundry next to the other partner who is busy reading. This translates into a variable with three levels: active engagement, passive engagement, and no engagement (i.e., social isolation).

Differentiating between active and passive forms of engagement has been useful for understanding gender differences in parental involvement, specifically women's continuing role as the central caregiver in dual-earner families (Kotila, Schoppe-Sullivan and Kamp Dush 2013), and the reduced rates of divorce associated with shared leisure time (Hill 1988). Research on couple togetherness and marital satisfaction also 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 those whom a person is somewhat required to be around, such as 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 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 of closeness and connection (Reis et al. 2000). In either case, we expect active engagement to associate with lower levels of loneliness than will passive engagement or social isolation.

The Interaction between Social Ties and Engagement Form

Loneliness is defined as an unmet desire for social engagement (Peplau et al. 1982). We propose that solving this problem is a unique case of support seeking because, unlike other forms of support seeking (such as seeking advice), direct forms of engagement (i.e., active engagement) may not be

necessary to receive support in this instance, as long as feelings of closeness can be established. Whom, though, will people turn to when solving this problem? Strong ties are not always the ideal source of support (Small 2013; Small and Sukhu 2016), and sometimes people rely on whom is available (Small 2017; Desmond 2012). Regardless of whom people turn to, feelings of closeness and connection are a central feature of strong ties and instrumental for ameliorating loneliness (Cacioppo et al. 2006; Thoits 2011). 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).

If feelings of closeness and connection are a primary benefit of active engagement but already present among those with whom a person has a close, preexisting relationship (e.g., friendship), then the presence of those ties may be similarly beneficial regardless of how they are engaged with. However, research also shows that people readily incorporate new network members into their core discussion networks, especially as people enter new social contexts (Small, Deeds Pamphile, and McMahan 2015). For new ties as well as existing weaker ties that may provide less closeness and connection (e.g., acquaintances), active engagement may be necessary to reduce feelings of loneliness. Overall, we expect engagement form will moderate the effect of tie type on loneliness, such that the advantage of active over passive engagement will be greatest among the ties with whom participants likely have the weakest relationship (acquaintances) relative to closer ties (family, partners, and friends).

METHODS

Data

We use a sample of 627 graduate students at a large public Mid-Atlantic university. Because the study is observational in nature, we cannot rule out the alternative causal direction to the one we implied in the text. As such, our results should be taken as associational rather than causal. We return to this point in more detail in the discussion. The data were part of a larger study on graduate student lives and mental wellbeing (Sayer et al. 2019). A sample of graduate students provides unique opportunities as well as limitations to answering our research questions. Like other network studies using graduate students (Small 2017; Small et al. 2015), this study capitalizes on a population that is in a relatively new social context, away from kinship and some friendship ties. This heightens the contextual factors that shape loneliness, a key focus for our study. However, it introduces biases related to the demographic makeup of the sample and their unique circumstances compared to the general population. As such, this study cannot make generalizable claims about all social networks.

We 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. These 1,876 time diaries yielded 21,245 total daily activities on which we base our analyses. Table 1 includes descriptive statistics for the sample as well as our 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 are 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 are 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 2016). If the participant enters an activity that cannot be matched to an

Table 1. Descriptive Statistics for Key Variables (N_{level1} ¼ 21,245; N_{level2} ¼ 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

existing category, they are asked to categorize the activity into existing codes to the best of their abilities. We 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 such as sleeping, showering, and getting ready. Due to the personal nature of these activities, we 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 1 includes the relative proportion of the remaining activities, which indicatesthat 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) as a proportion of reported activites. Participants engaged in more instances of activities related to their work (27 percent) and fewer instances of other activities (3 percent), which included things such as attending religious services and engagement with government services. For each of these activities, we 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 we use to construct our primary variables described in the next section.

Measures

Our dependent variable is a momentary assessment of perceived *loneliness*. We ask 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. 2018; Tam and Chan 2019; van Winkel et al. 2017). As shown in Table 1, the mean level of loneliness experienced in this study is about 1.68 on the 1 to 7 scale.

Respondents are also asked two questions designed to gauge with whom they are interacting during an activity as well as form of engagement. 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),[3] and no one. The latter question added "another" to the response option to reiterate that it is asking about a different person from the one who participated in the activity with the respondent.[4] Using these questions, we constructed our 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.[5] We prioritize the strongest tie in an interaction in our coding of variables.[6] To capture instances like these, we created an indicator variable to indicate interactions

3 Although pet(s) is a response option, we 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 our data to meaningfully examine.

4 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 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 than passive engagement with a co-worker at work. Supplemental analyses show that these types of situations are rare, occurring in fewer than two percent of interactions, suggesting that most participants are not interpreting the question to include masses of strangers.

5 We treat spouse/partner as a separate and stronger tie than other family members because past research suggests 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, fewer than two percent of interactions include a child and only about six percent of our sample even has a child, meaning it has to be lumped into a larger category. We 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 involve only the participant and partner and are often spent in leisure, sometimes while working, and often while consuming media. Results are substantively similar when children are included with spouses and partners (see online supplement S1).

with *multiple partners*. Only nine percent of activities involve multiple interaction partners. As shown in Table 1, almost half of daily activities are engaged in 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. Active engagement is defined as having at least one interaction partner in response to the "who participated in this activity with you?" question. Passive engagement is defined as having interaction partner(s) in response to the "who else was present?" question. As with our *interaction partner* variable, participants can select multiple interaction partners with whom they are actively and passively engaging. Interactions with both passive and active engagement are coded as having active engagement.[7] For these interactions with multiple partners, the *multiple partners* indicator described above would apply.

Between the *interaction partner* and *engagement* variables, our analyses capture information about who, how, and whether multiple people are interacting with the participant in a given situation. Because both the interaction partner and forms of engagement measures share being alone as the reference category, we use eight 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 X active engagement."

Analytic Strategy

Our analyses proceed in three stages. 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.[8] As a preliminary step, we 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 (s^2 ¼ .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 (q ¼ .496). Our first model predicts loneliness using interaction partners. Then, we predict loneliness using form of engagement. Finally, we predict loneliness using an interaction between partner and form of engagement using eight 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 and difference in differences between predicted values of loneliness across various categories of interest. All analyses are performed using Stata 16.

As noted above, the mean level of loneliness is toward the low end of the scale, indicating there is a possibility of floor effects, where there is less room for variation and thus diminished effect sizes. This is an important consideration because our analyses involve substantive comparisons of effect sizes across interaction type and form of engagement. There are three common ways to address comparisons of effect sizes in this case. One way would be to present standardized coefficients. However, the multilevel nature of our models makes this task less straightforward than in a single-level

6 Due to the large number of potential interaction combinations (4 active X 4 passive partners) and small cell sizes in these categories, we had to collapse these categories in our coding of this variable. Alternative specifications prioritizing active engagement partner leads to substantively similar results.

7 Supplemental analyses included an active þ passive engagement category, but this category did not significantly differ from just active engagement. Thus, we present the more parsimonious coding.

8 We use random intercept models rather than fixed effects models because we are interested in comparing time invariant demographic characteristics in our sample. Results are substantively similar using fixed effects and are included in online supplement S2.

model. For example, should one standardize to the entire sample or within participant? We rely on Hox, Moerbeek, and Van de Schoot's (2010) approach and include standardized coefficients in online supplement S3. An alternative way is to compare the unstandardized effects to the effects found in past work. Finally, one could compare effects to those for substantively meaningful demographic differences such as race or gender. We report these comparisons in the discussion of the results.

RESULTS

Social Ties and Loneliness

Table 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 might be expected by work on tie strength, 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 (D ¼ –.332 – (–.560) ¼ .229, $p < .001$), family (D ¼ –.332 þ .447 ¼ .115, $p < .01$), and spouses/partners (D ¼ –.332 þ .546 ¼ .215, $p < .001$).[9]

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 (D ¼ .014, *n.s.*), and interactions with friends are more beneficial than even interactions with non-spouse family (D ¼ .113, $p < .01$). Overall, these results suggest a clear distinction to be made between acquaintances and other associates, but not necessarily by tie strength as typically conceived of in past work. Results also suggest that strong ties such as family may not more strongly reduce loneliness than other ties among our population of graduate students, a point we will discuss in further detail in the discussion.

The type of activity also differentiates experiences of loneliness. Traveling is associated with lower levels of loneliness (b ¼ –.046, $p < .05$), whereas working (b ¼ .061, $p < .05$) and media consumption (b ¼ .062, $p < .05$) are associated with higher levels of loneliness than eating and drinking. Interestingly, weekends are associated with higher levels of loneliness (b ¼ .032, $p < .05$), again after taking interaction partner into account.

Engagement Form and Loneliness

Having examined the effects of interaction partners on sense of loneliness, we move on to examine the effects of form of engagement on loneliness. Model 2 of Table 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 our expectations, we find that active engagement has a larger effect on loneliness than passive engagement (D ¼ .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, D ¼ 0.014, *n.s.*).

Unlike the last model, we find a lack of effect of travel, media, and weekend days. Work is still associated with more loneliness (b ¼ .069, $p < .01$). These changing patterns by activity suggest that different activities are composed of different interaction partners and forms of engagement that can be untangled by examining the interaction of partner and engagement.

9 We 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.

Table 2. Random Intercept Regression Results for Loneliness on Interaction Partners and Form of Engagement (N_{level1} ¼ 21,245; N_{level2} ¼ 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 X Passive Engagement			–.165***
			(.025)
Friend X Passive Engagement			–.471***
			(.069)
Family X Passive Engagement			–.245***
			(.073)
Spouse/Partner X Passive Engagement			–.422***
			(.035)
Acquaintance X Active Engagement			–.463***
			(.024)
Friend X Active Engagement			–.576***
			(.027)
Family X Active Engagement			–.488***
			(.036)
Spouse/Partner X 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)

(*continued*)

Table 2. Random Intercept Regression Results for Loneliness on Interaction Partners and Form of Engagement (N_{level1} ¼ 21,245; N_{level2} ¼ 627)(continued)

	Model 1	*Model 2*	*Model 3*
Constant	2.202***	2.202***	2.200***
	(.226)	(.227)	(.226)
q	.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.

The Interaction between Social Ties and Engagement Form

Our final set of analyses shown in Model 3 of Table 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 1 graphically demonstrates these differences and we more formally test these differences below.

To more formally test for an interactive effect between engagement form and tie strength, we 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 (D ¼ .298, $p <$ .001), followed by family (D ¼ .243, $p < .01$), partner (D ¼ .160, $p < .001$), and friends (D ¼ .105, *n.s.*). This provides evidence for the idea that active engagement does not benefit all relationships equally. The effect of active engagement for acquaintances is larger than those for friends and spouses/partners (D_2 ¼ .298 – .105 ¼ .193 and D_2 ¼ .298 – .160 ¼ .138 for friend and spouse/partner comparisons, respectively, $p < .05$ across contrasts). However, contrary to our expectations, there is no difference between the effect of active engagement for acquaintances and for family (D_2 ¼ .298 – .243 ¼ .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 (D ¼ –.447 þ .332 ¼ –.115, $p <$ .01). The inclusion of form of engagement in Model 3 reduces the difference between non-spouse family and acquaintances to non-significance (D ¼ –.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.

Finally, as shown in Table 2, travel is once again predictive of less loneliness and weekends are predictive of more loneliness. Supplemental analyses show that at the bivariate level, travel is not associated with loneliness, and work and media consumption are related with more loneliness while leisure and weekends are associated with less loneliness. The fact that taking interaction partner type

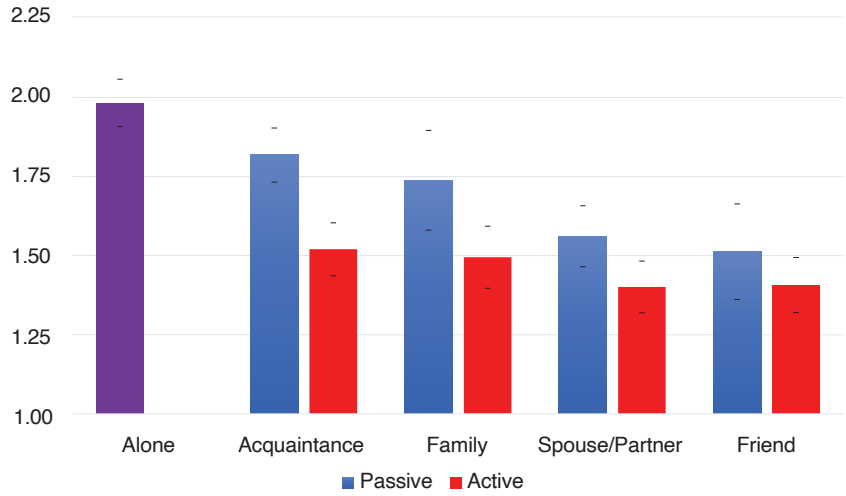

Figure 1. Predicted Loneliness by Interaction Partner and Form of Engagement

Note: Predicted values from models adjusting for race, gender, sexuality, age, activity, weekend status, and round of data collection. Bars are 95 percent 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.

and form of engagement into account seems to change these patterns suggest that some activities, such as traveling, may be peaceful respites, while typically social times, such as weekends, may not be all that social after all and may be social due only to their increased likelihood of including more potential (and realized) interaction partners.

DISCUS SION

We sought to examine type of social ties, form of engagement, and how they jointly influence perceptions of loneliness in daily interactions. Consistent with prior research (van Roekel et al. 2018), engagement with strong ties generally associated with reduced feelings of loneliness relative to engagement with weak ties. However, our results paint a more complicated picture that suggests, as scholars are increasingly noticing, tie strength does not operate in as clear a fashion as the strong versus weak tie dichotomy might suggest. More consistent in terms of empirical patterns but relatively 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, we found that engagement with various types of ties can be similarly beneficial for reducing loneliness, but only when these ties were engaged with actively. Taken together, these findings confirm and extend prior research by showing that the disadvantage of weak ties is situationally dependent and not universal (Brashears and Quintaine 2018; Small and Sukhu 2016; Small 2017). These findings also indicate the importance of engagement form is found in both its direct effect on loneliness and its moderating effect on social ties. Future research may benefit from assessing the moderating quality of engagement form on other important correlates of loneliness. These findings also highlight the importance of adjusting for engagement form. In our 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 (van Roekel et al. 2018) may be inflated due to not accounting for how people are engaging with these different ties.

An interesting and consistent pattern that arises out of the data shows that friends and romantic partners are similar in their ability to reduce a sense of loneliness. Some of these findings are due to friends and romantic partners being actively engaged with more often than are acquaintances and family members. However, even when taking form of engagement into account, we find that friends and romantic partners continue to stand out. Friends are typically conceived as being weaker ties than kin, but this assumption may not be the case given documented trends toward "families of choice" (Weeks, Heaphy, and Donovan 2001) and the changing nature of important social relationships (Giddens 1992).

Alternatively, it is possible that this finding may be a byproduct of the nature of our sample. Research on graduate student wellbeing finds that regular contact with friends associates with a lower likelihood of experiencing emotional or stress-related problems, while regular contact with family appears unrelated to these mental health outcomes (Hyun et al. 2006). Most graduate students are likely in a period of *emerging adulthood* (Arnett 2007), in which relationships with family, specifically parents, typically improve (Arnett 2004). At the same time, emerging adulthood is characterized by increased autonomy from family and a desire to avoid parental influence (Arnett 2004), while friendships tend to increase in emotional depth (Arnett 2007; Collins and van Dulmen 2006). Note, however, that although we discuss friendship as a moderately strong tie–stronger than acquaintances but weaker than family–our analyses do not presume ordering of tie strength. Given the potential influences specific to graduate students and emerging adulthood on family life, more research should be done to tease out the nature of these relationships in a different population.

Another consistent finding that raises interesting avenues for future research involves the changing effects of various activities and times of the week on loneliness. At the bivariate level, activities operate consistently with prior research finding reduced loneliness on weekends (van Roekel et al. 2018) and the potential for reduced loneliness during leisure (Pettigrew and Roberts 2008), as well as the potential for heightened levels of loneliness while at work (Ozcelik and Barsade 2018) and while consuming media, especially social media (Nowland, Necka, and Cacioppo 2018). After taking interaction partner and engagement form into account, however, some of these relationships reverse direction. Traveling, which was not associated with loneliness at the bivariate level, becomes consistently related with lower loneliness, while weekends become a potential source of loneliness. Although it is beyond the scope of this paper to examine these findings in more depth, they do suggest that times of the week and activities may themselves provide important buffers or stressors in generating negative outcomes due to loneliness. Indeed, supplemental analyses (see Table S5) show that activities tend to correlate with different forms of engagement. These findings suggest that researchers should investigate activities and times of the week as further factors accentuating or diminishing the benefits of social interaction.

Along with interactions with romantic partners, interactions with friends associated with the lowest levels of loneliness observed in our sample. Given our research design, we are unable to know whether these friendship designations were reciprocal. Research suggests that many likely were not (Ball and Newman 2013; Hallinan 1978). It therefore remains an open question whether unreciprocated friendships are any less beneficial than reciprocated friendships for avoiding feelings of loneliness. If interactions with reciprocal and nonreciprocal friends are similarly beneficial, this opens up a potentially fruitful avenue of research for studying the benefits of "optimistic" views regarding the size of individuals' friendship networks, which research finds to be predictive of unreciprocated friendships (An and McConnell 2015).

Overall, findings generally achieved statistical significance in the expected directions, and we 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 our 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).

Although this study provides a new lens through which scholars can better understand the value of social engagement with various social ties, it has several limitations that could be addressed in future work. Although our separate measurement of active and passive engagement is an advancement over the single measure of social engagement employed by prior research, it does not account for the presence of strangers. For example, riding a bus or attending a class consists of engagement in the same activity as proximate others, but participants are unlikely to perceive themselves as being actively engaged with these other people, given that most of these people would be unknown to the participant. Further, some participants may not have reported the presence of strangers at all because we did not give participants a "stranger" response category—rather, we provided a set of options for categorizing known associates and a non-family "other" category, for all others who did not fit into the provided options. If participants chose to report the presence of strangers, this would have been the appropriate category to select. We can separate out potential interactions with strangers by separately analyzing interactions with these non-family others. Ultimately, supplementary analyses show that fewer than three percent of activities feature interactions with only non-family others and separating these interactions from the acquaintance category does not notably alter our findings for acquaintances. We do not focus specifically on strangers in this study because participants may have underreported their presence. 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.

Because the study is part of a larger project with broader goals (Sayer et al. 2019), the sample is homogeneous and not representative of a general population. Although some have argued that homogenous samples are better for testing theoretical arguments due to fewer potential sources of confounds (Calder, Phillips, and Tybout 1982), this sample is also relatively uniquely positioned in the social structure in ways that make some findings (such as the friends versus family finding discussed above) more difficult to interpret than those from a more general population. Our findings that form of engagement amplifies benefits of weak ties and dampens protective benefits of strong ties points to the utility of future research examining this with different populations. Relatedly, our sample is also less White than the broader U.S. population. This is important for the present study because research finds that both the quantity and quality of social connections are shaped by race (Umberson and Karas Montez 2010). Research finds that differences in educational attainment and income also contribute to higher levels of loneliness among Hispanics and, to a lesser extent, Blacks relative to Whites (Hawkley et al. 2008). Consistent with this, we observed no differences in the momentary experience of loneliness between White and Black participants.

We did observe heightened rates of loneliness 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 and difficulty in establishing and maintaining relationships during graduate school as a result (Myers-Walls et al. 2011). Or they may be related to differences in income, discrimination, and (where applicable) the unique challenges faced by international students (Sherry, Thomas, and Chui 2010). While our findings are somewhat consistent with the findings of previous research highlighting the unequal distribution of social isolation and loneliness by race, we do not know how our findings would be impacted by a more racially representative sample.

Differential drop-off through later rounds of data collection suggests our sample may be biased toward participants who have more time to complete the study. However, methodological research on similarly-designed studies find that busier people are not systematically underrepresented in these types of study (Abraham, Maitland, and Bianchi 2006). That said, less integrated people may be less

likely to be contacted and are thus underrepresented (Abraham et al. 2006). One of the benefits of using a student sample is that it reduces the issue of non-contact. Participants in our study are recruited through their official university contact, so less connected students should not be less likely to be contacted.

Because loneliness is assessed in the moment, we cannot rule out the alternative causal direction to the one we implied in the text. Although our 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 Cacciopi 2007) and may avoid social interactions as a result (Gable and Gosnell 2013). In an attempt to address this issue, we conducted supplemental analyses that account for trait loneliness using the abbreviated UCLA loneliness scale (Russell 1996). These analyses show that the results presented here are robust to individual traits, 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 our sample by nearly half. Therefore, these results should be taken as associational rather than causal.

Relatedly, the choice to engage passively may result from the presence of conflict in the relationship. Conflict may also influence how participants categorize others—especially relationships that are easily redefined, like friendship. Therefore, the heightened loneliness experienced when engaged passively or interacting with acquaintances may be due at least partly to relationship difficulties. Although we lack a direct measure of relationship conflict, we do have detailed measures of the emotions experienced within each situation. We 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 our data indicate that these states do not influence the relationship between form of engagement, type of interaction partner, and loneliness (see online supplement S4). We therefore conclude that our findings are likely not driven by relationship conflict, but future research would benefit from a more direct assessment of such strain.

Despite its limitations, 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).

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