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Social Connections During Physical Isolation: How a Shift to Online Interaction Explains Friendship Satisfaction and Social Well-Being

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Abstract

Measures implemented to combat the spread of COVID-19 have included stay-at-home orders, social distancing, and self-isolation, all of which have limited in-person interactions. Given the key role of technology in maintaining social connections during this period, the current study examined the experiences of young adults who shifted from predominantly offline to online interaction with friends during COVID-19. Specifically, we investigated whether changing from interacting predominantly with friends in-person to interacting predominantly with friends online (conceptualized as a major change in context of interaction) was associated with lower social well-being (i.e., greater loneliness and lower social connectedness), and examined whether perceived changes in friendship satisfaction as a result of the pandemic mediated these effects. Participants (N = 329; 68.1% female) were Australian young adults, aged between 17 and 25 years (M_{age} = 20.05 years, SD = 1.97). Data were collected between April 15th and May 24th, 2020, during the nationwide lockdown in Australia. Results indicated that for young adults who primarily interacted offline with friends prior to COVID-19 (as compared to those who interacted predominantly online or equally online and offline before the pandemic), the shift away from face-to-face interactions was associated with a greater perceived reduction in satisfaction with friendships, which, in turn, was associated with greater loneliness and lower social connectedness. Our results highlight the need to consider how young adults adjust to changes in contexts for engaging with friends and how they maintain meaningful social interactions with others during times of extended physical isolation.

Keywords: COVID-19; online interaction; friendship satisfaction; loneliness; social connectedness

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Introduction

The COVID-19 pandemic has had an undeniable impact around the world. Government measures implemented in some countries to reduce the spread of COVID-19—prior to vaccination rollouts—have predominantly been based around limiting physical contact and have included stay-at-home orders or lockdowns, social distancing, and self-isolation (World Health Organisation, 2021). Despite the importance of such measures to combat the spread of the virus, each of these can present barriers to our typical or 'normal' methods of interacting with close others and for many people, these changes have incited an unprecedented shift in the management of personal relationships, and reductions in social connection. To encourage adherence to these distancing measures while

at the same time maintaining relationships, the advice of authorities has been to replace face-to-face (offline) interactions with technology-mediated interactions. Both reductions in social connection and changes in social relationships with the move to online interactions during COVID-19 have important implications for social well-being.

Emerging research during the COVID-19 pandemic has highlighted several concerns for mental health that are likely to result from decreased social connection and increased social or physical isolation, including risks of increased psychological distress and lowered life satisfaction (e.g., Biddle et al., 2020; Killgore et al., 2020). Further, loneliness—an indicator of social well-being—has been highlighted as a key mental health concern during the current pandemic (Galea et al., 2020; Killgore et al., 2020; Palgi et al., 2020), particularly among young adults (Biddle et al., 2020; Fancourt et al., 2020; C. M. Lee et al., 2020). Reasons for rises in loneliness include increased COVID-19 stress (Ellis et al., 2020), social isolation (Killgore et al., 2020), and reduced or no contact with social networks (Elmer et al., 2020). There are serious mental health concerns linked to lower social well-being, including increases in depression, anxiety, and stress (C. M. Lee et al., 2020; Richardson et al., 2017). Such mental health issues are particularly important for young people, as experiencing mental health problems in adolescence and early adulthood is associated with adverse outcomes in subsequent years, including recurring episodes of depression, anxiety, suicidal ideation and suicide attempts, unemployment, and welfare dependence (Fergusson et al., 2007; Gibb et al., 2010; Lewinsohn et al., 1999).

Recent research also suggests that spending virtual time with friends during the COVID-19 pandemic may provide opportunities for social support and be a buffer against increased loneliness as a result of isolation (Ellis et al., 2020; van Breen et al., 2020; Wray-Lake et al., 2020). Further, research has found that online social connection buffers the negative effects of isolation and health anxiety on depression (Stuart et al., 2021). Yet, the effects of such sudden shifts to online interactions for friendships and social well-being remain largely unknown. Indeed, although research into the relationships between online social connection and mental health during COVID-19 is beginning to emerge, to date, there has been little examination of young adults' perceptions of transformations in their social relationships during COVID-19, or of the consequences of migrating relationships into the online environment. As such, the current study aimed to enhance our understanding of the social consequences of COVID-19 by examining young adults' perceptions of change in social relationships as a result of COVID-19 and the implications for changes in friendship satisfaction and social well-being (i.e., loneliness and social connectedness). In order to highlight the innovation of this study and the need to know more about the consequences of shifting to online interactions during COVID-19, we first describe the extant research concerning interactions across online and offline contexts with friends in young adulthood, followed by a discussion of social relationships and social well-being during COVID-19.

Contemporary Friendships: Interaction in Online and Offline Contexts

The importance of close, high-quality friendships for young adults' positive adjustment is well understood. Friendship satisfaction, or an individual's subjective evaluation of the quality and characteristics of their relationships in meeting their fundamental needs (D. C. Jones, 1991), offers insight into individuals' perceptions of their friendships. Parker and Asher (1993) explain that the fundamental characteristics of friendships, including "validation and caring, companionship and recreation, help and guidance, and intimate exchange," are associated with greater friendship satisfaction (p. 617). However, although there is an established literature exploring the importance of friendships in offline settings, the popularity of online environments for social connection and relationship maintenance among young adults necessitates further research that explores contemporary friendships as they occur across online and offline contexts.

Recent research has demonstrated that online environments provide an important extension for offline friendships and that friendships are now maintained across both online and offline settings, particularly among young people (Reich et al., 2012). Online contexts facilitate interactions and provide opportunities for relationship maintenance with existing friends, with research finding that the majority of young adults interact with their existing friends online (i.e., via text or instant messaging, and social networking sites including Facebook, Instagram, and Twitter; Reich et al., 2012; Scott et al., 2021). Further, research has found that most young people who connect with existing friends through social media report that online interactions enhance feelings of connection towards their friends (Lenhart et al., 2015). Additional evidence suggests that key elements of friendships—including self-disclosure, companionship, and conflict—are demonstrated within both online and offline interactions, illustrating that online settings are important contexts in which friendships may be

meaningfully maintained (Yau & Reich, 2018; Yau & Reich, 2020). However, online contexts are not necessarily the primary or preferred setting in which young people interact with close friends.

In a recent research study (Scott et al., 2021) it was found that just over half of the young adults in the sample typically interacted with friends equally across online and offline settings, and a smaller percentage interacted either predominantly online or offline. This finding supports the notion that for many young adults, friendships are maintained in both online and offline contexts, but further demonstrates that there is variation between young adults in how they enact their friendships. Although this research did not explicitly investigate young adults' preferences for online and offline communication with friends, it provides insight into patterns of interactions with friends across contexts for young adults. Such patterns of interaction are especially important to consider following the widespread move away from in-person interactions that occurred during the COVID-19 pandemic, particularly in countries with government-mandated lockdowns, or in cases of voluntary physical isolation to reduce the risk of infection and transmission.

Understanding Social Relationships During COVID-19

Social restrictions during the COVID-19 pandemic have required, and may continue to require, that individuals alter their normal ways of connecting with others by shifting their social lives online (Saltzman et al., 2020; Wiederhold, 2020). Two theoretical approaches are relevant in understanding why people are both being encouraged, and personally driven, to use the internet during COVID-19, and why social internet use may have positive outcomes. First, the uses and gratifications framework suggests that the potential fulfillment of individuals' social and psychological needs (such as needs for social interaction and self-expression) motivate internet use (Papacharissi & Rubin, 2000). Second, as highlighted by Moore and March (2020), the social compensation hypothesis may elucidate the increase in social internet use during COVID-19. Specifically, during times of limited physical interactions, the online environment may provide an alternative social setting in which individuals are able to compensate for lost (or fewer) offline encounters with close friends, and to relieve feelings of loneliness (Moore & March, 2020; Valkenburg & Peter, 2007). Accordingly, individuals are engaging in more frequent online interactions during COVID-19—particularly during times of lockdown—to fulfill an inherent need for social connection, and to replace face-to-face exchanges that are central to friendships. However, the shift to online interactions may pose difficulties for some people.

For young people who primarily interacted with friends offline before COVID-19, lockdowns and physical isolation provide significant barriers to continuing typical, or preferred, face-to-face interactions. It remains unknown how the major and unexpected shift from offline to online interaction as a result of COVID-19 may be associated with changes in friendship satisfaction. It is possible that when shifting from offline contexts as a primary location for interaction, some young adults may find online interactions with friends to be of lower quality and that social support derived online is perceived as less "rich" than offline, due to features of the online environment such as an absence of nonverbal cues and asynchronicity (Nesi et al., 2018). These attributes that are unique to digital contexts may be perceived as less satisfying or inhibiting within interactions for young adults who typically interact with friends in face-to-face settings. Therefore, we propose that young adults who primarily interacted with friends offline before COVID-19 and shifted to primarily interacting with friends online during lockdown (i.e., who experienced a major change in context of interaction), would report a reduction in friendship satisfaction as compared to young adults who more commonly interacted in online spaces with friends (**H1**). Furthermore, reduced friendship satisfaction and changing interactions with friends as a result of the pandemic could have additional implications for social well-being during COVID-19. These considerations are explored in the following section.

Social Well-Being During COVID-19

Friendships in young adulthood offer a significant source of social support and are a central determinant of well-being (Buote et al., 2007; Hartup & Stevens, 1997). This is particularly true for social well-being, defined as the extent to which individuals feel connected to, and supported by, others (Keyes, 1998). Social well-being reflects one's satisfaction with, and quality of, social connections and relationships (Larson, 1993). As such, the development and maintenance of close, high-quality friendships during young adulthood is a key developmental task that provides many benefits in a time characterized by social transitions (Scales et al., 2016). However, it is possible that if social connections are not satisfying, not achieved, or disrupted, individuals' social well-being may

decline. Therefore, it is imperative that research investigates both the interpersonal and social well-being consequences of major changes in typical ways of connecting with close friends during the global COVID-19 pandemic among young adults.

Two key indicators of social well-being that are particularly relevant for investigating the social consequences of COVID-19 are loneliness and social connectedness. Loneliness and associated feelings of discomfort or distress may arise from a mismatch between one's preferred and achieved levels of social engagement and can be affected by both the quality and quantity of social connections (Perlman & Peplau, 1981). Studies on the effects of COVID-19 on loneliness have produced mixed findings. For example, Luchetti et al. (2020) demonstrated no significant changes in loneliness during the first outbreak of COVID-19 in the United States, and Bu and colleagues (2020) showed that, overall, loneliness was relatively stable during the pandemic in the United Kingdom. However, some studies (e.g., Krendl & Perry, 2021; C. M. Lee et al., 2020) found increases in loneliness following the onset of the pandemic. These inconsistent findings may reflect the divergent situations and experiences encountered by individuals throughout the pandemic. Two predictors of key interest in the current study are changes in, and lower satisfaction with, social relationships (W. H. Jones et al., 1985; Perlman & Peplau, 1981). Understanding how such factors may contribute to experiencing greater loneliness during the COVID-19 pandemic is crucial in providing support and resources for managing mental health.

Related to, but distinct from loneliness, is social connectedness. Social connectedness measures enduring feelings of meaningful interpersonal relatedness and durable connections to others and the social world (R. M. Lee et al., 2001) and may be predicted by perceptions of friendship closeness and relationship satisfaction (van Bel et al., 2009). Although perceptions of social connectedness are typically considered more enduring and less susceptible to changes in social interactions (Williams & Galliher, 2006), it is also possible that prolonged changes and barriers to typical methods of (offline) social interactions during COVID-19 may impact one's sense of social connectedness. Therefore, in the current study, loneliness and social connectedness are considered complementary indicators of social well-being and connectedness with others (or lack thereof). We hypothesized that perceived decreases in friendship satisfaction as a result of the COVID-19 pandemic would be associated with higher loneliness and lower levels of social connectedness (**H2**).

COVID-19 restrictions have incited changes in the ways that people interact with friends, and such changes may have direct implications for social well-being if young adults' needs for social connection are not met. Accordingly, in this research we also hypothesized that experiencing a major shift away from offline interaction with friends would be directly associated with greater loneliness, and lower levels of social connectedness (**H3**). Our study adds to the growing literature surrounding COVID-19 outcomes by exploring interpersonal connectedness in addition to loneliness and examining young adults' perceptions of their social relationships before and during COVID-19. We aimed to investigate whether major changes in the context of social relationships were associated with decreases in friendship satisfaction and risks to social well-being during COVID-19. In doing so, we anticipated that it may be more difficult for some young adults (those who typically interact with friends offline) to shift to online interactions with friends and to replace offline interactions in compensatory ways in the absence of physical interactions. Our final hypothesis, therefore, proposed indirect effects whereby experiencing a major shift in one's context of interaction with friends during COVID-19 would be associated with lower social connectedness and greater loneliness via reduced friendship satisfaction (**H4**).

The Current Study

It is undoubtedly important to maintain social connections digitally during the period of reduced in-person interaction that has been brought about by the global pandemic (Banerjee & Rai, 2020; Lim, 2020). Yet, the outcomes of this for social well-being may differ for those who were more familiar with, or preferred interacting online prior to COVID-19 relative to those who have experienced a major change in interactions with the move to predominantly online interactions with friends. The current study aimed to investigate the effects of the global pandemic on personal relationships by exploring how, during times of mandatory social distancing, the social contexts in which young adults interacted with friends changed. We sought to determine whether for those who underwent major shifts in the context of interaction (i.e., from primarily interacting offline before COVID-19 to primarily interacting online during COVID-19) there were perceptions of change in friendship satisfaction and, in turn, lower social well-being. Such a study is particularly important given the dynamic and ongoing nature of COVID-19, and the associated, unpredictable lockdowns, periods of isolation, and uncertainty surrounding the future of our interactions with others. It is important to investigate what may predict loneliness and social

connectedness to better understand the consequences of COVID-19 and physical isolation for mental health, and to work towards promoting more positive outcomes for social well-being.

Methods

Participants and Procedure

Data were collected between April 15th and May 24th, 2020, during the nationwide lockdown in Australia, following the first wave of COVID-19 infections. Prior to data collection, ethical approval for the study was granted by the university Human Research Ethics Committee. A total of 404 young adults aged between 17 and 25 years old participated in the study and provided full data on the measures of interest. These young adults were undergraduate students from an Australian university and were recruited either from an undergraduate psychology course, or from a volunteer research email distributed to university students. Participants of the study completed an online survey of approximately 30 minutes in duration. Those who participated as part of their undergraduate psychology course were offered course credit for their involvement and other students from the voluntary research email were not offered compensation.

Key criteria for inclusion in the current study were that the young adults were primarily interacting with friends online at the time of data collection (during lockdown). Of the overall sample, only 9.7% ($n = 39$) retrospectively reported primarily interacting with friends online *before* the COVID-19 pandemic. In contrast, there was a considerable shift to online communication as a result of COVID-19, with 81.4% ($n = 329$) of young adults reporting that they primarily interacted with friends online *during* COVID-19. However, 18.6% of the sample ($n = 75$ young adults) indicated that they were still primarily interacting with friends in offline settings or across online and offline contexts during lockdown and were thus excluded from analyses. The decision to exclude these participants was made as we were interested in the effects among young adults who were interacting *online* during COVID-19 lockdown, and this approach allowed us to explore the outcomes associated with a major shift from offline to online interaction with close friends. Details about this sample including independent samples t-tests between the included and excluded samples, and associations among variables of interest, are presented in the Appendix. As such, the sample includes the 329 young adults who reported primarily interacting with friends online during the height of the COVID-19 restrictions, 68.1% ($n = 224$) of whom identified as female, 28.6% ($n = 94$) as male, and 11 participants who were missing gender information. The sample had a mean age of 20.05 years ($SD = 1.97$) and ethnicity was reported as 76.1% Caucasian (White), 10% Asian, 1.8% Indigenous Peoples (First Nations), 1.8% African, and 10.3% from other backgrounds. These demographics did not substantially differ from the overall sample.

Measures

Respondents' primary context of interaction with close friends before and during the COVID-19 pandemic was operationalized into a dichotomous variable using ratings from two discrete questions: *Before the COVID-19 pandemic, where did you primarily interact with your close friends?* and *Where do you currently primarily interact with your close friends?* Responses on both questions were scored as 1 = *Mostly online*, 2 = *About the same online/offline*, or 3 = *Mostly offline/face-to-face*. These two items were used in conjunction to assess the change in primary interaction contexts during COVID-19 and create the variable *Major Context Change*. Those who indicated that they interacted mostly online ($n = 36$) or about the same online and offline with close friends ($n = 153$) prior to COVID-19 were coded as 0 = *No major context change* ($n = 189$), and those who reported interacting mostly offline with friends before COVID-19 were coded as 1 = *Major context change* ($n = 140$; see Table 1 for details).

Friendship Satisfaction Change

Perceptions of change in friendship satisfaction was measured with one item, developed for the current study: *How has the COVID-19 pandemic changed how satisfied you are with your friendships?* Participants answered along a 5-point response scale, from 1 = *Much less satisfied*, to 5 = *Much more satisfied*. Higher scores indicated increased satisfaction with friendships during the COVID-19 pandemic.

Loneliness

The eight-item version of the UCLA Loneliness scale (ULS-8; Hays & DiMatteo, 1987; Russell et al., 1980) was used in the current study. Participants are asked to report how often they feel the way described in eight statements along a 4-point frequency scale (1 = *Never* to 4 = *Often*). Example items include *I feel isolated from others*, and *There is no one I can turn to*. Internal reliability of the ULS-8 was good ($\alpha = .79$). Higher scores indicate higher levels of loneliness.

Social Connectedness

Six items adapted from the Social Connectedness Scale-Revised (R. M. Lee et al., 2001) were included in the current study to measure perceptions of social connectedness. The items were measured on a 6-point scale, from 1 = *Strongly disagree* to 6 = *Strongly agree*, and the measure showed good internal reliability ($\alpha = .81$). Example items include *I am able to connect with other people*, and *I feel close to people*. Higher scores indicate greater feelings of social connectedness.

Internet Use

Participants answered a one-item measure of internet use during the COVID-19 lockdown: How many hours per day on average do you currently spend using the internet? Responses were reported from 0 to 24 hours.

Descriptive Measures

Interaction Frequency With Close Friends. Participants were asked two questions that assessed their frequency of interactions with close friends: *Before the COVID-19 pandemic, how frequently did you interact with your close friends?* and *How frequently do you currently interact with your close friends?* Responses on both questions were scored as 1 = *Less than once a month* to 7 = *Multiple times per day*. These two items were used together to develop discrepancy scores for descriptive analyses, detailed below.

Friendship Satisfaction. The Satisfaction subscale of the Network of Relationships Inventory Relationship Qualities Version (NRI-RQV; Buhrmester & Furman, 2008) was included to assess young adults' satisfaction with their close friendships during lockdown ($\alpha = .94$). Participants answered three items, including *How satisfied are you with your relationships with your close friends?* Responses were measured on a 5-point scale, from 1 = *Hardly at all* to 6 = *Extremely much*. This measure is distinct from the measure of Friendship Satisfaction Change and was included only for descriptive analyses.

Data Analytic Strategy

Data were analyzed using SPSS Version 26 and Mplus Version 8 (Muthén & Muthén, 2017). To operationalize the change in interaction contexts, independent samples t-tests were first conducted to examine differences between young adults who primarily interacted online, offline, or about the same online and offline prior to COVID-19 on measures of friendship satisfaction change, loneliness, and social connectedness. The differences between the online and equally online and offline groups were not significant, and as such, these were collapsed together (see Appendix for details). A variable labelled *Major Context Change* was computed whereby young adults who previously interacted primarily online, or about the same online and offline, were together coded as 0, and young adults who previously primarily interacted with close friends offline were coded as 1. See Table 1 for crosstabs on young adults' primary interaction contexts before and during the COVID-19 lockdown in Australia.

Following the computation of the major context change variable, two stages of analyses were conducted. First, descriptive analyses and correlations were run between the variables of interest. Second, a path model using observed variables tested the direct effects of a major change in interaction context on loneliness and social connectedness, as well as indirect effects through change in satisfaction with friendships as a result of the pandemic. All path coefficients were estimated simultaneously. To determine the significance of the indirect pathways, 10,000 bootstrapped samples were conducted, producing 95% confidence intervals of the indirect effects (Hayes, 2009). If the 95% confidence intervals did not include zero, the indirect effects were interpreted as

significant. To assess the fit of our path model, three indices were used: the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the standardized root mean square residual (SRMR)¹. Good model fit is achieved with an RMSEA value of less than .06, an SRMR value of less than .10 and a CFI value greater than .95 (Iacobucci, 2010; Weston & Gore, 2006). We also report the chi-square index (χ^2) and note that a non-significant χ^2 indicates that the model fits the data well (Weston & Gore, 2006).

Table 1. Crosstabs on Young Adults' Primary Interaction Contexts With Close Friends Before COVID-19 and During COVID-19 Lockdown in Australia (N = 404).

		Where do you currently primarily interact with your close friends?			Total
		Mostly online	About the same online/offline	Mostly offline	
Before the COVID-19 pandemic, where did you primarily interact with your close friends?	Mostly online	36^a	2	1	39
	About the same online/offline	153^a	32	7	192
	Mostly offline	140^b	21	12	173
Total		329	55	20	404

Note. Above numbers reflect all young adults (N = 404). Criteria for inclusion in the present study were that young adults were primarily interacting with friends online at the time of data collection (presented in bold text).

^a Coded together as 0 = No major context change. ^b Coded as 1 = Major context change.

Results

Descriptive Analyses

To provide some insight into the stability of young adults' social networks during COVID-19 lockdown, discrepancy scores were calculated for young adults' frequency of interactions with close friends before and during lockdown. The discrepancy scores were computed by subtracting young adults' pre-COVID-19 interaction frequency from their current interaction frequency with close friends. The scores indicate that on average, young adults interacted slightly less with their friends during lockdown than before COVID-19 (see Table 2). Further, those who maintained or increased connections with friends during COVID-19 lockdown reported higher satisfaction with their close friendships, higher social connectedness, and less loneliness.

Table 2. Pearson Correlations Between Interaction Frequency Discrepancy Scores, Friendship Satisfaction, Loneliness, and Social Connectedness (N = 329).

	1.	2.	3.	4.	Mean (SD)
1. Frequency Discrepancy ^a	—				-0.56 (1.90)
2. Friendship Satisfaction	.20***	—			3.57 (1.01)
3. Loneliness	-.22***	-.39***	—		2.43 (0.58)
4. Social Connectedness	.26***	.52***	-.58***	—	3.16 (0.88)

Note. ^a Frequency Discrepancy: Current interaction frequency—pre-COVID interaction frequency. Higher scores indicate more frequent interaction during COVID-19 lockdown. *** $p < .001$.

Associations Among Variables

Bivariate correlations and descriptive statistics among the variables included in the predictive model are presented in Table 3. All correlations were of weak to moderate strength and in the expected directions. Importantly, experiencing a major context change was negatively associated with friendship satisfaction change and social connectedness, but positively associated with loneliness. Such correlations indicate that young adults who primarily interacted with friends offline before the COVID-19 lockdown reported feeling less satisfied with friendships, less socially connected, and more lonely as compared to those young adults who interacted primarily online or equally across online and offline contexts prior to COVID-19 (i.e., no major context change). Loneliness was negatively associated with both friendship satisfaction change and social connectedness, indicating that those who reported more positive changes in friendship satisfaction and higher social connectedness also reported

lower loneliness. Finally, the control variable of gender was negatively associated with friendship satisfaction change and social connectedness, and positively correlated with loneliness.

Table 3. Descriptive Statistics and Pearson Correlations Amongst Measures of Gender, Age, Internet Use, Interaction Contexts, Friendship Satisfaction Change, Loneliness and Social Connectedness, for Young Adults Interacting With Friends Primarily Online During COVID-19 (N = 316).

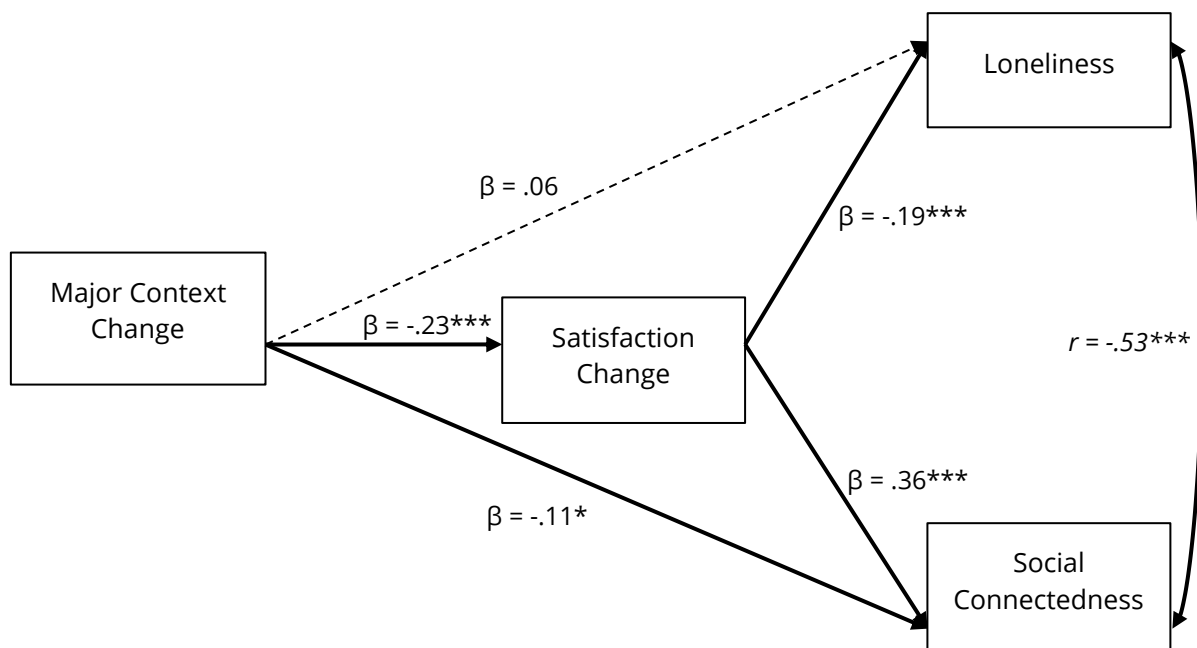
	1.	2.	3.	4.	5.	6.	7.	Mean (SD)
1. Major Context Change	—							
2. Satisfaction Change	-.23***	—						2.50 (0.79)
3. Loneliness	.12*	-.22***	—					2.43 (0.58)
4. Social Connectedness	-.19**	.39***	-.58***	—				3.17 (0.87)
5. Internet Use	-.03	.07	.08	-.03	—			9.97 (3.53)
6. Age	.03	.04	-.08	.04	-.01	—		20.05 (1.97)
7. Gender ^a	.10	-.12*	.20***	-.14*	-.17**	-.06	—	

Note. ^a Gender: 0 = Male, 1 = Female. Major Context Change: 0 = No major context change, i.e., those who primarily interacted with friends online or about the same online and offline before COVID-19, 1 = Major context change, i.e., those who primarily interacted with friends offline before COVID-19. * $p < .05$, ** $p < .01$, *** $p < .001$.

Model Testing

The path model developed for analyses tested both the direct relationships and indirect effects of a major context change on loneliness and social connectedness via change in satisfaction with close friendships during the pandemic (Figure 1). The model fit for the mediation model was good.

Figure 1. Mediation Model Testing the Role of Friendship Satisfaction Change During the Covid-19 Pandemic in Relationships Between Major Context Change, and Loneliness and Social Connectedness (Controlling for Covariates).



Note. $N = 314$. Major Context Change: 0 = No major context change, i.e., those who primarily interacted with friends online or about the same online and offline before COVID-19, 1 = Major context change, i.e., those who primarily interacted with friends offline before COVID-19. Covariates were gender, age, and internet use. Dotted lines represent non-significant relationships; solid lines represent significant paths. Model fit: $\chi^2(3) = 4.21, p = .239, CFI = .99, RMSEA = .04 [.00, .11], SRMR = .03$. * $p < .05$, *** $p < .001$.

In terms of direct effects, young adults who experienced a major context change from offline to online interaction with friends during COVID-19 reported significantly lower social connectedness, and decreased friendship satisfaction (see Table 4). There was no significant direct effect of major context change on loneliness. Reduced satisfaction with close friendships because of the pandemic was also directly associated with lower social connectedness, and greater loneliness. The indirect effects indicated that young adults who reported undergoing a major context change during COVID-19 reported decreased satisfaction with close friendships, which, in turn,

was associated with greater loneliness ($\beta = .04, p = .008, CI_{95\%} = .02 \text{ to } .08$) and lower feelings of social connectedness ($\beta = -.09, p < .001, CI_{95\%} = -.13 \text{ to } -.04$).

Table 4. Bootstrapped Standardized Direct, Indirect, and Total Effects and 95% Confidence Intervals (95% CI) of the Mediation Model ($N = 317$).

Outcome	Direct						Indirect			Total		
	Satisfaction Change			Loneliness			On Loneliness via Satisfaction Change			Loneliness		
	β	p	95% CI	β	p	95% CI	β	p	95% CI	β	p	95% CI
Major Context Change	-.23	<.000	-.33, -.13	.06	.283	-.05, .17	.04	.008	.02, .08	.10	.064	-.01, .21
Satisfaction Change				-.19	<.000	-.29, -.08						
Covariates												
Gender ^a				.19	.002	.07, .30						
Age				-.06	.307	-.16, .05						
Internet Use				.12	.021	.02, .23						

Outcome	Direct						Indirect			Total		
	Satisfaction Change			Social Connectedness			On Social Connectedness via Satisfaction Change			Social Connectedness		
	β	p	95% CI	β	p	95% CI	β	p	95% CI	β	p	95% CI
Major Context Change	-.23	<.000	-.33, -.13	-.11	.043	-.21, -.002	-.09	<.000	-.13, -.04	-.19	<.000	-.30, -.08
Satisfaction Change				.36	<.000	.26, .46						
Covariates												
Gender ^a				-.10	.084	-.21, .01						
Age				.02	.680	-.08, .12						
Internet Use				-.07	.135	-.17, .02						

Note. ^aGender: 0 = Male, 1 = Female. Significant effects are presented in **bold text**.

Discussion

The COVID-19 pandemic and the resultant implementation of social restrictions to combat the spread of the virus in many countries have driven a widespread change in the management of social relationships. The current study aimed to further our understanding of the social consequences of COVID-19 by exploring the impacts of shifting from primarily interacting offline to online interactions with friends on changes in friendship satisfaction and, in turn, social well-being. The results of this study provide an important extension to previous research that has emerged during the pandemic by examining perceptions of change in young adults' social relationships. In support of our hypotheses, we demonstrated that for young adults who primarily interacted offline before COVID-19, the sudden shift away from in-person social interactions (and the move to interacting online during the pandemic) was associated with decreased friendship satisfaction, and in turn, higher loneliness and lower social connectedness. At the same time, in support of research highlighting the importance of technology use as a buffer of loneliness during the pandemic (Saltzman et al., 2020), our results demonstrated that for young adults who previously interacted primarily online or across contexts with friends, the shift to online interaction was less detrimental for changes in friendship satisfaction and social well-being. These findings are discussed in detail below.

Online Interactions and Friendship Satisfaction

Fewer than 10% of Australian young adults in the current study reported interacting primarily online with close friends prior to COVID-19 lockdown. However, in line with the social compensation hypothesis, over 80% of young adults reported that their interactions with close friends took place predominantly online following the implementation of social distancing and stay-at-home orders. This shift, for many young people, meant adjusting to a potentially less fulfilling social context online as compared to offline. Such a sudden change in interaction style and adoption of digital technologies as a replacement for offline connection has implications for friendship

satisfaction. Nesi et al. (2018) explain that the asynchronous nature of online environments and reduced nonverbal cues online may act as barriers to both the quality of interactions online and to social support processes more broadly. A loss of such important features of offline communication—or at least, familiar features of offline interactions for some young adults—in the transition to online communication, can increase the potential for misinterpretation of shared messages and information, of inaccurately interpreting the tone of messages, and a lack of emotion expressed online (Nesi et al., 2018). Each of these are important considerations in understanding satisfaction with online interactions and may assist in explaining why some young adults reported feeling less satisfied with friendships following a shift from offline to online interaction contexts in the current study.

Our results may also be interpreted in another light due to the way in which we assessed the impact of a major context change. Specifically, in comparison to youth who primarily interacted offline before COVID-19, young adults in the current study who previously interacted online or interacted flexibly with friends across contexts reported significantly less reduction in close friendship satisfaction during lockdown. This indicates that there may be protective benefits for some people in interacting with others online, particularly in times where face-to-face interactions are forcibly limited. Indeed, social information processing theory (Walther, 1992) suggests that despite the lack of nonverbal cues in online settings, interactions in online contexts can, over time, foster relationships that are equally as meaningful as those in face-to-face settings. In line with this, young adults who interacted online with friends prior to COVID-19 may have been more predisposed to online contexts as a means of communication and therefore, better able to navigate online interactions with friends during the pandemic without experiencing decreases in friendship satisfaction. The uses and gratifications approach to internet and social media use (Papacharissi & Rubin, 2000) may also assist in interpreting this finding. Specifically, those young adults who previously interacted with friends more online, and therefore used the internet to meet social connection needs prior to lockdown, were able to continue interacting with friends in more comfortable and habitual ways at the height of COVID-19 restrictions in Australia. These young adults, therefore, reported significantly less reduction in friendship satisfaction. Following these interpretations, it is also important to consider the role of friendship satisfaction in the broader associations between shifting to online interactions and social well-being.

Social Well-Being

Social well-being is influenced by one's perceptions of, and satisfaction with, meaningful social relationships (Larson, 1993). Thus, it follows that in the current study, loneliness and social connectedness were significantly and negatively correlated. Further, shifting from predominantly offline to online interactions was associated with reduced friendship satisfaction and, in turn, with greater loneliness, and lower levels of social connectedness. Moving from offline to online contexts of interaction with friends during COVID-19 lockdown was also directly associated with lower levels of social connectedness during this time. These findings demonstrate that there may be negative outcomes of disruptions in typical methods of social connection for young adults' social well-being both directly and indirectly through reduced satisfaction with friendships. However, positive perceptions of friendships and familiarity with online interaction can also be protective against negative social well-being outcomes. We again emphasise that previously interacting online or across online and offline contexts (therefore, not experiencing such a substantial shift away from face-to-face interactions) and perceiving less of a reduction in friendship satisfaction were directly associated with higher social well-being during COVID-19 lockdown. This interpretation highlights potential benefits of the internet for interacting with friends, and the importance of taking a flexible approach to interacting with friends across online and offline contexts, particularly when offline interactions are not available.

The findings of the current study have important implications for online interactions in contexts beyond the COVID-19 pandemic. We suggest that future research investigates the consequences of a shift from offline to online interactions with friends in other situations where individuals may be forced to interact in ways that are different to their preferred approach to social interaction. For example, examining the impacts of moving away to attend college (geographical restriction), or the impact of health issues that reduce or remove social connection on changes in interaction contexts with close friends and the associated effects on social well-being. Promotion of contemporary online methods of connection as meaningful, rather than simply replacing what is "lost" during times of restricted face-to-face interaction may also assist young adults in understanding how to effectively maintain connections with others online and to perceive their friendships as equally satisfying in online and offline settings. Additionally, for young adults who are less engaged with online interaction, discussion of *how* digital technologies may be used to maintain satisfying relationships is crucial.

Research suggests that in order to alleviate loneliness and enhance connectedness, online interactions must contribute to supportive social connection (Nowland et al., 2018). For example, Clark and colleagues (2018) highlight that social networking sites may increase loneliness when used for “temporary but illusory fulfillment of social needs” (p. 33). Conversely, social networking site use motivated by the desire to connect with others has previously been shown to reduce feelings of loneliness (Teppers et al., 2014). Additionally, some research suggests that synchronous social media use may lead to enhanced communication, satisfaction, and gratification from social interactions online (Jiang et al., 2013). Taken together, these findings indicate that the type of online connection with friends, and motivation for enhancing existing connections, may assist in promoting friendship satisfaction and feelings of connectedness.

Relevant literature emerging throughout the COVID-19 pandemic also suggests that there may be benefits of more frequent online contact with friends during lockdown for loneliness and social support (Ellis et al., 2020; van Breen et al., 2020; Wray-Lake et al., 2020). Ellis and colleagues (2020) encouraged the use of virtual connections to alleviate loneliness in times of stress and uncertainty and highlighted the need for youth to be taught to be “mindful about having supportive peer interactions” (p. 183). Thus, not only is the frequency of online interaction important in the face of lost opportunities for connection offline but ensuring that online interactions are supportive and rich is also crucial for social well-being. Such findings highlight the need to consider the role of technology and digital media during the COVID-19 pandemic as an alternative to face-to-face interaction, and how we may promote meaningful connections and positive social well-being for young people who are less familiar, or do not have preferences for interacting in online spaces.

Limitations

The current study adds to our understanding of the social consequences of COVID-19 and it is strengthened by the time of data collection (at the height of lockdown restrictions in Australia). However, there are limitations that must be considered. First, we did not examine the forms taken by, or “richness” of young adults’ interactions with close friends. Consideration of online tools and the differences between video calls and instant messaging are important as richer communication settings allow for more synchronous communication and promote the visual expression of non-verbal cues for emotional bonding, support and affection, that may negate the loss of such features of offline communication (Nesi et al., 2018; Sherman et al., 2013). Future research should endeavor to determine if interacting in socially rich online settings (i.e., video chat) can buffer against the potentially damaging effects of a major shift from interacting in primarily offline to online settings. As our descriptive analyses suggest the importance of interaction frequency, additional considerations may include the frequency of online interactions with friends, and the positive or negative valence of interactions online. Extending this limitation, the current study did not explore the ways in which young adults were interacting offline with close friends during lockdown. It is possible that our sample of excluded young adults (those who were interacting offline, or across online and offline contexts with close friends during lockdown) were potentially living with friends as roommates, or considered “essential workers” and therefore interacting with close friends at work. To overcome this limitation in future work, we recommend that researchers explicitly ask participants how they maintain their close friendships across online and offline contexts.

Further, we used cross-sectional data and retrospective accounts of perceptions of change in interactions with friends and as such, cannot provide conclusive evidence of the direction of the associations of interest, nor can we provide objective accounts of change. Cross-sectional data and retrospective accounts of social interactions were, however, useful considering the timely nature of COVID-19 data collection during lockdown and assisted in illuminating and exploring possible predictors of changes in friendship satisfaction and social well-being during this time. This approach to data collection also allowed us to assess individual perceptions of change, and therefore, we provide insight into how young adults think and feel about their social relationships. However, we suggest that to provide a fuller picture of factors that may predict changes in young adults’ friendship satisfaction and social well-being during physical isolation, future research could explore other related factors, such as use of the internet for non-social purposes, and work, study, or health-related issues. Finally, our results reflect views about friendship satisfaction, social connectedness, and loneliness during the early stages of COVID-19. It is possible that young adults who experience poorer social well-being in the initial shift away from offline interactions may develop better and more fulfilling strategies for online interactions with friends over time, that enable them to experience the benefits of online connections. As the pandemic and social restrictions are still unfolding in

many countries, there is a need for continued research into the social consequences of this pandemic into the future.

Conclusion

As the COVID-19 pandemic continues to impact many individuals, communities, and nations around the world, the current study offers insight into how restrictions on offline interactions may operate as a barrier to our typical ways of connecting, and the implications of this for friendship satisfaction, loneliness and social connectedness. Importantly, a key indicator of how online interactions may shape friendship satisfaction and well-being during this global pandemic, is where young adults report to have previously interacted with friends. Young adults who experienced a major shift from offline to online interactions with friends were more likely to report reduced friendship satisfaction, lower social connectedness, and greater loneliness during lockdown. However, for young adults who were more familiar with online contexts, and thus may have been more comfortable with online interactions prior to COVID-19, we demonstrated benefits of enacting friendships across both online and offline settings for both friendship satisfaction and social well-being.

Biddle and colleagues (2020) recently demonstrated that the easing of social restrictions in Australia reduced feelings of loneliness over time, suggesting that the current findings are not indicative of permanent changes in social connection. However, in times of long-lasting uncertainty and restricted social interaction—both during COVID-19 and beyond the pandemic—young adults' needs for meaningful, satisfying friendships and to feel a sense of connectedness with those around them are especially relevant. As a result of COVID-19, individuals will likely need to alter their ways of connecting with others in the long term and may continue to have to compensate for lost or reduced offline interactions. This is important both within and outside the context of friendships, as the pandemic has required us to move online across multiple contexts including work and study as well as other social interactions. These changes are likely to have long term repercussions for how we conduct our everyday lives online. Therefore, throughout COVID-19 and more broadly, we suggest that practitioners may assist young people in reframing how they conceptualize satisfaction with friends and define their social relationships online, and assist young people in both developing their digital literacy and adjusting to online contexts for social interaction. Further, scholars must work to enhance our understanding of how to support young adults to better maintain meaningful connections with friends in times of limited offline interaction because it is imperative that young adults are equipped with the skills and knowledge to foster meaningful, purposeful interactions in online settings.

Footnotes

¹ For more information on these model fit indices including definitions and fit guidelines, please refer to Iacobucci (2010), and Weston and Gore (2006).

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Conflict of Interest

The Authors declare that there is no conflict of interest.

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Appendix

Independent Samples t-tests With Included Sample

The following independent samples t-test results include the details of the t-tests reported in the Data Analytic Strategy and were conducted in the development of the *Major Context Change* variable. Specifically, these independent samples t-tests were conducted to examine differences between young adults who primarily interacted online, offline, or about the same online and offline prior to COVID-19 on measures of friendship satisfaction change, loneliness, and social connectedness. All included participants were interacting online at the time of data collection ($N = 328$).

As reported in the manuscript, there were no significant differences between the groups who interacted primarily online or about the same online and offline before COVID-19. However, both of these groups reported significantly more positive friendship satisfaction change and social connectedness when compared to young adults who reported interacting primarily offline before the COVID-19 lockdown (see Table A1 for descriptive statistics; all p 's $< .05$). As the differences between the online and equally online and offline groups were not significant, these were collapsed together.

Table A1. Descriptive Statistics of Measures for Young Adults who Primarily Interacted Online, Offline, or About the Same Across Contexts Prior to COVID-19.

	Before the COVID-19 pandemic, where did you primarily interact with your close friends?		
	Mostly online Mean (SD)	About the same online/offline Mean (SD)	Mostly offline Mean (SD)
Satisfaction Change	2.83 (0.78)	2.59 (0.78)	2.28 (0.74)**
Loneliness	2.34 (0.58)	2.39 (0.55)	2.50 (0.59)
Social Connectedness	3.33 (0.99)	3.28 (0.84)	2.99 (0.86)*
<i>N</i>	36	153	139

Note. * $p < .05$, significantly different from both other groups. ** $p < .001$, significantly different from both other groups.

Supplementary Materials for Excluded Sample

The following supplementary materials are provided to shed light on associations among variables of interest for the excluded sample of young adults who were interacting with friends primarily offline or across online and offline contexts during COVID-19 lockdown. These participants were excluded from the substantial analyses as the primary aim of this research was to examine the outcomes associated with a major shift from offline to online interaction with close friends. As such, it was critical to include only young adults who were interacting *online* during COVID-19 lockdown.

Independent Samples t-tests

The following t-tests were conducted to determine whether there were differences between the groups of young adults who were included versus excluded from the core analyses of this paper. We tested whether groups of young adults who interacted online during COVID-19 lockdown ($n = 328$) differed from those who interacted offline or across contexts ($n = 75$) on measures of friendship satisfaction change, loneliness, and social connectedness.

Results indicated that young adults who interacted primarily offline with close friends during lockdown reported significantly *less* reduction in their friendship satisfaction as a result of the pandemic ($M = 2.73$, $SD = 0.84$) when compared to young adults that interacted online during lockdown ($M = 2.48$, $SD = 0.79$). There were no differences in the included versus excluded groups across loneliness or social connectedness (p 's $> .05$). The mean score on loneliness for the 75 young adults who primarily interacted offline during lockdown was $M = 2.34$ ($SD = 0.59$) versus $M = 2.43$ ($SD = 0.58$) for young adults interacting online. The mean score on social connectedness for the 75 young adults who primarily interacted offline during lockdown was $M = 3.33$ ($SD = 0.99$) versus $M = 3.16$ ($SD = 0.88$) for young adults interacting online.

Bivariate Correlations

Regarding correlations among variables in the group of 75 young adults who were interacting offline or across contexts during lockdown (see Table A2), feeling more satisfied with friendships during lockdown was related to greater feelings of social connectedness, but not associated with loneliness. Loneliness and social connectedness were significantly and negatively correlated.

Table A2. *Pearson Correlations Between Friendship Satisfaction Change, Loneliness, and Social Connectedness for the Sample of Young Adults Interacting Primarily Offline or Across Contexts During Lockdown (N = 75).*

	1.	2.	3.	Mean (SD)
1. Satisfaction Change	—			2.73 (0.84)
2. Loneliness	-.19	—		2.33 (0.59)
3. Social Connectedness	.40***	-.62***	—	3.33 (0.99)

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

About Authors

Riley A. Scott is a PhD Candidate in the Griffith University School of Applied Psychology. Her research interests focus on adolescent and young adults' intrapersonal characteristics and use of the internet and social media, with a specific focus on the development and maintenance of close friendships, and how experiences unique to the digital or online environment affect how people think, feel and act.

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Bonnie L. Barber (Ph.D., University of Michigan) is the Dean (Research) for the Health Group at Griffith University. Bonnie is a developmental psychologist specializing in youth engagement and well-being. She is especially interested in the impact of young people's leisure time activity pursuits and their use of technology.

Karlee J. O'Donnell is currently a PhD candidate in the School of Applied Psychology, Griffith University. Her research focuses on online contexts and how they are used by adolescents and young adults for development in identity and relational domains. For her PhD, Karlee is investigating how young adults' motivations for self-disclosure on social networking sites align with their developmental needs and the implications of these motivations on daily affect and social connection.

Alexander W. O'Donnell is a social and developmental psychologist currently employed at the University of Tasmania, Australia. Broadly, his work looks to ameliorate social disadvantages by exploring mechanisms to reduce social exclusion and increase social and psychological well-being. He has a keen interest in longitudinal research methodologies and statistics.

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