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Modelling Age-Varying Associations among Group Memberships, Neighborhood Connectedness, and Well-Being

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Research Note/ Note de recherche

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Résumé

Les personnes qui maintiennent des affiliations à des organismes communautaires ont tendance à éprouver un meilleur bien-être que celles qui participent peu ou pas du tout à la vie communautaire. Il existe néanmoins peu d'enquêtes visant la variabilité des corrélats de l'affiliation à des organismes tout au long de la vie. La présente étude a examiné la variabilité liée à l'âge de l'association entre l'affiliation à des organismes et le sentiment subjectif d'appartenance ainsi que le bien-être. L'étude comptait 3 940 participants (âge moyen = 45,61 ans, écart-type = 15,62) canadiens et américains qui ont répondu à un sondage en ligne en août 2020 (soit au milieu de la pandémie de COVID-19). La modélisation des effets variables dans le temps a été utilisée pour estimer les coefficients d'affiliation à des organismes à chaque âge au sein de l'échantillon. L'affiliation à des groupes sociaux a permis de prédire positivement le sentiment d'appartenance, et cette association était la plus forte entre l'âge moyen et l'âge avancé; une association similaire était également évidente dans les prédictions de bien-être. Le sentiment d'appartenance était également un prédicteur positif du bien-être à tous les âges. Ces résultats s'appuient sur des recherches émergentes qui montrent l'importance de l'affiliation à des organismes communautaires chez les personnes d'âge moyen ou plus âgées.

Abstract

Individuals who maintain group memberships in their community tend to experience improved well-being relative to those who participate in few or no groups. There are, however, few investigations targeting variability in the correlates of group membership across the lifespan. The present examination probed age-related variability in the association between group memberships and subjective connectedness as well as well-being. Participants included 3,940 (mean age = 45.61 years, standard deviation [SD] = 15.62) Canadian and American respondents who completed an online survey during August of 2020 (i.e., amidst the COVID-19 pandemic). Time-varying effects modelling was used to estimate coefficients for group membership at each age within the sample. Memberships in social groups positively predicted connectedness, and this association was strongest in middle-to-older age; a similar association was also evident when predicting well-being. Connectedness was also a positive predictor of well-being throughout most ages. These findings build on emerging research conveying how group memberships have significance for people currently in middle-to-older age.

Introduction

Humans require social connections. People are healthier and happier when they experience social connectedness through close personal relationships and membership in groups, and by identifying with valued categories (Baumeister & Leary, 1995). For example, Holt-Lunstad, Smith, and Layton's (2010) meta-analysis revealed that individuals who maintain more (and higher-quality) social connections live longer than others with fewer social ties or close relationships. Similarly, people experience harmful health effects from social isolation (Nicholson, 2012). Having established seminal theory and consistent evidence pertaining to correlates of group memberships and social participation, an important task for researchers is to explore variability in this association. Researchers must focus on for whom and in which contexts associations between social connection and psychosocial correlates are relatively stronger or weaker. The current article considers correlates of community-based small group memberships and examines variability in the extent to which group memberships predict several key correlates, including subjective neighborhood connectedness and subjective well-being.

Community-Based Small Group Memberships

Community-based small group memberships represent one context with unique value as a resource for social connections. Small groups experienced in one's community include numerous voluntary group memberships that people maintain outside of the home and which relate to spheres of life such as recreation, community action, advocacy, and religion (e.g., Glei et al., 2005). Common measures capture, for example, formal memberships in sport clubs, religious groups, and youth groups, among others that reflect well-being-enhancing social participation (e.g., Santini et al., 2020). Group memberships have such a consistent association with well-being that Haslam, Jetten, Cruwys, Dingle, and Haslam (2018) advocated for broader use of initiatives in organizations, communities, and psychological services to help individuals maintain well-being by establishing stronger ties with small groups (Haslam et al., 2018). For example, interventions in clinical and counselling settings have been designed to promote psychological well-being by encouraging participants to maintain group memberships and recall or reflect on group identities (Steffens et al., 2021).

Despite the consistency in evidence regarding the value of groups, there is also variability in the strength of the link between groups and well-being. Group memberships are more strongly associated with psychological well-being for certain groups of people, such as those with low socio-economic status (Haslam et al., 2020; Wang, Yang, Hu, & Chen, 2021). Similarly, whereas membership in community groups is linked to a reduction in symptoms of depression, this association is particularly strong among those with clinical diagnoses related to depression (Cruwys et al., 2013).

Age is likely a further source of variability in this association, and is the focal point of the current investigation. Several converging lines of evidence suggest that researchers view age as an important source of variance. First, researchers examining the role of group memberships for subjective connectedness and well-being often control for the variance attributed to age to better specify effects (e.g., Cruwys et al., 2013). Second, researchers often target specific age groups for whom they presume group memberships will be most salient. Studies involving samples of older adults have demonstrated that social participation through community-based groups is critical to their maintaining a sense of connectedness with others throughout the transitions that unfold throughout older age (e.g., Glei et al., 2005; Lam et al., 2020). Adolescents and young adults also demonstrate improved psychological adjustment and report greater well-being when they participate in extracurricular activities, community groups, and volunteering initiatives (e.g., Forgeard & Benson, 2019). Third, theorists contend that social connections address unique psychosocial needs for people across the lifespan. Whereas groups may provide a context for older adults to engage in social participation that is critical for maintaining cognitive function (Paiva, Cunha, Voss, & Matos, 2023), adolescents may benefit by gaining interpersonal developmental assets (e.g., fostering character; Fredricks & Eccles, 2006).

Relative to the volume of evidence regarding group memberships alongside perceptions of connectedness and well-being, relatively less is known about how this association varies across the lifespan. One relevant investigation used cross-lagged panel models involving longitudinal associations between subjective frequency of social interactions with others and self-reported mental health, with separate analyses across three groups of participants (i.e., below 30 years of age, between 30 and 50 years of age, and 50 years of age and older; Kiely, Sutherland, Butterworth, & Reavley, 2021). One small but consistent effect across all age groups was that mental health was positively predictive of later social connectedness perceptions. In contrast, the group that was 50 years of age and older was the only sample in which there was a lagged temporal association whereby earlier connectedness predicted later mental health (Kiely et al., 2021). These findings reveal the role of connectedness among older adults, but our ability to understand variability across ages remains limited.

The Current Study

The current study was undertaken to examine age-related variability in how community-based group memberships are associated with subjective well-being and perceived social connectedness. Although they carry significance across the lifespan, both of these outcome variables are of importance in older adult samples and represent outcomes that are both conceptually distal (well-being) and proximal (connectedness) to memberships in groups. Older adults' subjective well-being is often reported at comparable (or higher) levels relative to younger age comparisons but is nevertheless indicative of cognitive and physical function as well as longevity for older adults (Steptoe, Deaton, & Stone, 2015). Whereas there are varying operationalizations of subjective connectedness used in studies with older adults, the present investigation operationalized connectedness based on the extent that people feel a sense of psychological bonding with others and belonging in one or more contexts. This operationalization aligns with numerous studies including older adults, which have demonstrated that connectedness is a predictor of life satisfaction, subjective well-being, and engaging in new activities (see O'Rourke & Sidani, 2017).

The methodology for this article is closely tied to the study purpose. Existing studies either descriptively contrast effects across age groups chosen by researchers (Kiely et al., 2021) or adopt moderation analyses in which the influence of age is constrained to be parametric. In contrast, the present study includes time-varying effects modelling (TVEM) (Tan, Shiyko, Li, Li, & Dierker, 2012) to model variability in the correlates of group memberships across ages with data from a large and nationally representative cross-sectional survey from Canada and the United States. TVEM was used to flexibly model the ways in which associations between group memberships and correlates strengthen or weaken at differing ages. Using a continuous and non-parametric function of time (Lanza & Linden-Carmichael, 2021), researchers use TVEM with cross-sectional data to estimate coefficients that resemble those found in a linear regression framework for many time points (Tan et al., 2012).

TVEM is often used to model longitudinal data to demonstrate within-person trends, such as pinpointing periods of behaviour change during and following an intervention (Lanza, Vasilenko, Liu, Li, & Piper, 2013). Yet, TVEM is also a powerful tool for probing age-related variability in cross-sectional data (Lanza, Vasilenko, & Russell, 2016). In a tutorial article encouraging use of this approach, Costello and Murphy (2023) reflected on applying TVEM to gerontological research. Their article also conducted novel cross-sectional analyses that documented variability of anxiety and depression symptoms with age and across different populations. Indeed, gerontological researchers are increasingly using TVEM to examine ages at which an association between two variables is comparably stronger or weaker relative to other time points

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(Cai et al., 2023; Chamberlain, Sprague, & Ross, 2022; Freed, Sprague, & Ross, 2023; Jung, Kim, Loprinzi, Ryu, & Kang, 2023; Sprague, Phillips, & Ross, 2019). Most of these investigations examined links between cognitive function and other relevant variables, but the study by Cai et al. (2023) is an exemplar study examining variability in the association between one's social relationships (i.e., familial support) and depressive symptoms, using a large archival data set with participants in China. TVEM analyses revealed that certain familial sources of support were stronger negative predictors of depression in those 60–70 years of age (i.e., time spent with younger children), relative to other forms that were more strongly predictive with participants over 70 years of age (i.e., financial support).

In the current study, TVEM was used to identify participant ages during which the association between group memberships and well-being as well as subjective connectedness were: (1) significantly different from a null association, and/or (2) different in magnitude or direction from other age groups within the sample. The present analyses examined specific ages at which group membership was a comparatively stronger or weaker predictor. Findings about variability in the magnitude of this association are important to specify age group targets for interventions and initiatives to promote social connections. Although there is evidence that group memberships may have stronger associations with well-being or connectedness for younger or older individuals, TVEM analyses flexibly model coefficient functions so that age-related patterns take on any shape (i.e., potentially many curves, signifying a change in magnitude). Accordingly, the present study leveraged TVEM as an exploratory tool.

It is also crucial to note that this investigation included online survey data collected during the height of the social interaction restrictions brought about in the United States and Canada during the 2020 pandemic of COVID-19. Although this investigation was not designed to test the consequences of social distancing, this was a time when social interactions were salient. For example, a study using one large Canadian sample reported that loneliness experienced amidst the pandemic was associated with anxiety and depression in all age groups (Gregory et al., 2021), although adults 55 years of age and older were the least likely to report worsening mental health symptoms. Loneliness, depression symptoms, and dampened well-being resulting from lockdowns were also often a function of the extent to which people lost access to social relationships (e.g., Birditt, Turkelson, Fingerman, Polenick, & Oya, 2021; Krendl & Perry, 2021). As some group experiences were curtailed during 2020, participants' memberships may have shifted during this time. Whereas the magnitude of associations tested in this investigation were likely influenced in ways that may not directly generalize to other points in time, this research tests fundamental social processes that presumably transfer across contexts.

Methods

Participants and Procedures

The sample (n = 3940) retained for the main analyses was drawn from the Recovery and Resilience data set (Stephenson et al., 2021), which was collected via a multi-national online survey study by a collaborative group of researchers. Data collection was conducted by Leger panels, which draws from voluntary participants in Canada and the United States (e.g., more than 500,000 Canadian respondents). Data were collected from August 25 to August 31, 2020, and were sampled to obtain representation relative to age, sex, and country region. Surveys were completed in English and French in Canada, and in English only in the United States. The data set and technical report on sampling are available online (https://doi.org/10.5683/SP3/5QHKJE).

Several steps were taken to prepare the sample for proposed analyses. First, analyses include only participants who provided responses to at least two (of the three) key variables of interest. Second, the sample was constrained to those who were 73 years of age or younger – removing 233 individuals who were older than 73 years. This is because an assumption of TVEM models is that there are sufficient cases (e.g., participant responses) across the entire distribution of time (Lanza et al., 2016). The time variable can be represented by several types of continuous values such as chronological age (e.g., years) or the number of days following an event (e.g., days following intervention), but there nevertheless needs to be adequate power to estimate effects at each separate time point. Whereas the number of respondents for each individual age from 18 to 73 were sufficient, there were comparatively fewer participants at several ages greater than 73 years. From an original sample including 4,234 responses, the resulting sample after removing missing responses and reducing the age range included 3,940 individuals (53% female; mean age [M_{age}] = 45.61 years, standard deviation [SD] = 15.62). Regarding the distribution of participant age-specific samples, the average number of participants per age was 70.35 individuals (SD = 13.79) with a range from 45 participants 18 years of age to 122 participants 35 years of age. Participant demographics are presented in Table 1, and the complete distribution of ages is available in the Supplemental Material.

Measures

The Recovery and Resilience data set includes items spanning individuals' social environment, experiences during the COVID-19 pandemic, health, and attitudes. The variables for the current investigation are detailed in the next sections.

Group memberships

Participants described the groups to which they belonged using following the stem: "In the past 12 months, were you a member or participant in any of the following types of groups, organizations or associations?" Participants could select one or more groups to which they belonged, including an option to indicate an "other" group membership not contained within the list. Because participants identified group memberships by specifying different types of groups, the resulting group membership variable represents both the number of groups to which an individual belongs and the range of group contexts within which those groups are embedded. Following the approach taken by researchers exploring the psychosocial correlates of belonging to small groups (e.g., Cruwys et al., 2013), participants' responses were summed into an aggregate variable representing group memberships ranging from 0 (no groups listed), 1 (one group type listed), or 2 (two or more group types listed).

Neighborhood connectedness

Participants responded to the prompt "I have a sense of being connected to my community." on a scale from 1 (strongly disagree) to 4 (strongly agree). This item resembles the tool used by Wang et al. (2021) that measured community identification.

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Table 1. Participant characteristics

Demographic Characteristic	Percentage (%) of Sample (n = 3,940)	
Sex	53 female	
Country	50 United States	
Ethnicity	77 white (8 black, 4 Hispanic/Latin American, 12 other)	
Education	84 obtained post-secondary education	
Relationship status	57 married or living with a partner	
Employment status	8 unemployed	
Disability status	17 identify as having a disability	
Immigration status	13 identify as born in another country	
Group memberships	43 reported group memberships (27 one group; 15 two or more groups)	
Specific memberships	Union or professional	14
	Sport or recreational	11
	Cultural, educational, hobby	9
	Religious-affiliated	8
	Political group	8
	Neighborhood/civic association	5
	Seniors' group	4
	Service club	3
	Cooperative	2
	Youth organization	2
	Ethnic/immigrant	1
	Other	6

Subjective well-being

Participants provided one-item responses to capture both subjective well-being and loneliness. Following the stem "Please indicate the extent to which you agree with the following statements," participants completed one item for well-being ("My life is good") on a scale from 1 (strongly disagree) to 7 (strongly agree).

Socio-demographic and health beliefs items

Additional items from the survey were used to describe the sample and adjust model estimates based on pertinent covariates, which included sex, country of residence, and whether participants self-identified as unemployed. Two further Likert-style items used as covariates included subjective health (i.e., "In general, would you say your health is: 1 [excellent] to 5 [poor]?"), and self-reported personal health risks of the ongoing COVID-19 pandemic ("How much of a threat, if any, is the COVID-19 pandemic for your personal health?")

Analyses

Preliminary analyses involved reporting participant characteristics and bivariate correlations before conducting linear regressions to identify preliminary associations between study constructs. Three linear regressions were conducted, including analyses using group memberships as a predictor for connectedness (Regression 1) and well-being (Regression 2), as well as considering connectedness as a predictor for well-being (Regression 3). In each regression, an initial step included control variables (i.e., sex, employment status, personal COVID risk, country of residence, and subjective health). The primary predictor for each regression was then added at a subsequent step.

Primary analyses included conducting TVEM using the SAS macro developed by Li et al. (2017). Models estimated coefficients from the ages of 18 to 73 as a continuous span –estimating age variability by splitting the span of time equally into 100 equal time points (e.g., 18 years, 18.56 years, 19.11 years). The first set of analyses involved intercept-only models in which the only covariate (beyond control variables) was a constant value (1). Intercept-only models illustrate patterns in responses to each outcome variable across ages. Next, TVEMs were conducted with one time-varying covariate (e.g., group memberships), which means that the coefficients between the predictor and outcome variable were expected to change across ages. Five time-invariant covariates were also included in models, spanning sex, employment status, personal COVID risk, country of residence, and subjective health. The term "time invariant" means that the model was constructed such that the associations between each covariate and dependent variable were constant across age. Recent applications of TVEM in gerontological research have also specified models in which the primary predictor is time varying, whereas additional covariates are time invariant when there is limited explicit theory leading researchers to presume that associations with control variables would vary with time (e.g., Freed et al., 2023; Jung et al., 2023). Example SAS code is available in online Supplemental Materials.

TVEM is a non-parametric model that estimates the nature of the intercept and the shape of the slope from available data and across several time intervals. Fitting a TVEM involves selecting the optimal number of segments upon which the coefficients curve, termed "knots" (Tan et al., 2012). Present analyses included a P-spline approach in which the researcher sets the maximum number of knots (i.e., 10; Li et al., 2017) and subsequent analyses fit a curve to the data and utilize smoothing to select the most parsimonious model. P-spline approaches are widely adopted in recent literature (e.g., Cai et al., 2023; Jung et al., 2023) and are useful in exploratory analyses (e.g., Lanza & Linden-Carmichael, 2021). Whereas alternative spline approaches such as the B-spline approach permit increased flexibility and reduce the risk that a model will be overly smoothed (i.e., too few inflection points), P-spline approaches were selected to align with existing literature, and because of the exploratory nature of the present analyses. TVEM results for this study are illustrated in the form of figures because of the large number of coefficients from each model (i.e., 100). The text identifies and elaborates on periods of time when the 95 per cent confidence intervals (CI) at a specific age differ from zero (i.e., significant effect) and differ from other ages (i.e., time-varying effect across age).

Whereas TVEM macros do not currently include tools for conducting a priori power analyses, Chamberlain et al. (2022) reflected on power by estimating required sample sizes to conduct a regression for each age level in their investigation. To calculate the required sample size using a moderate anticipated effect size (0.20) resembling existing studies involving group memberships – with desired power of 0.8 and with six predictors – the minimal required sample size is 75 individuals. Whereas some specific ages were under-powered relative to this ideal (i.e., ages 18, 26, and 73 each had between 40 and 50 participants) the average age-specific sample from this data set do align with this target. The current

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analyses are also adequately powered because TVEM integrates information nearby younger or older ages when fitting coefficient curves, reducing the impact of ages with low sample sizes.

Results

Descriptive Statistics and Preliminary Analyses

Table 1 presents participant characteristics and Table 2 presents bivariate correlations as well as the descriptive statistics for key study variables. There were positive bivariate correlations between number of group memberships and both connectedness (r [3,833] = 0.17, $p < 0.001$) and well-being (r [3,909] = 0.14, $p < 0.001$). The number of group memberships did not significantly correlate with age, but positive correlations were evident between age and connectedness (r [3,822] = 0.09, $p < 0.001$) as well as well-being (r [3,909] = 0.12, $p < 0.001$).

Table 2 also identifies associations of key socio-demographic and contextual variables with both age and group memberships. For example, those reporting an increased number of group contexts reported lower perceptions of poor health (r [3,920] = -0.16, $p < 0.001$) and reported higher perceptions of COVID threat (r [3,877] = 0.08, $p < 0.001$). Meanwhile, those who were older reported greater perceptions of poor health (r [3,920] = 0.12, $p < 0.001$); age was not significantly correlated with perceptions of COVID threat.

Linear regressions examined the extent to which group memberships and connectedness were significant predictors of dependent variables when spanning all ages (see Table 3). Group memberships significantly predicted both connectedness and well-being, and connectedness was a significant predictor of well-being; ΔR^2 were descriptively small in size (i.e., 0.004–0.02), indicating that these associations were small in magnitude with a sample spanning all ages.

TVEM

Intercept-only TVEM described time-varying patterns in responses for three key study constructs. As illustrated in Figure 1, the proportions of individuals reporting one or more group memberships held relatively constant across the sample but increased starting at 67 years. Small age-related increases were identified for both connectedness and well-being ratings. The remaining TVEM are described subsequently and illustrated in Figures 2 and 3. The coefficients for each model related to each control variable are provided in the online Supplemental Materials.

It is important to recall that figures represent the estimated (not observed) linear regression coefficients for the predictor upon the dependent variable across a continuous span of approximately 100 intervals. Significant coefficients are those where 95 per cent CIs do not include zero, while time varying effects are evident to the extent that CIs at one time point fall beyond those at another time

Table 2. Bivariate correlations

		1	2	3	4	5	6	7	8	9
Key variables	1. Group memberships	–								
	2. Perceived connectedness	0.17*	–							
	3. Well-being	0.14*	0.23*	–						
	4. Age	0.02	0.09*	0.12*	–					
Personal characteristics	5. Sex (1 = female, 0 = male)	−0.01	−0.06*	−0.05	−0.09*	–				
	6. Country (1 = Canada, 0 = US)	−0.10*	0.03	−0.06*	0.01	0.05*	–			
	7. Employment (1 = not unemployed, 0 = unemployed)	0.11*	0.06*	0.20*	0.12*	−0.01	−0.09*	–		
	8. Poor health	−0.16*	−0.17*	−0.40*	−0.12*	0.05*	0.04	−0.08*	–	
	9. COVID threat	0.08*	0.06*	0.15*	0.02	0.06*	−0.02	0.22*	−0.01	–
	M	0.55	2.89	5.29	3.26	45.61	–	–	2.62	4.53
	SD	0.75	0.89	1.48	2.02	15.62	–	–	1.00	1.86
	Range	0–2	1–4	1–7	1–7	18–73	–	–	1–5	1–7

*$p < 0.001$

Table 3. Summaries of linear regressions

Predictor	DV	Overall Model Adjusted R^2	Change in R^2	B (SE)
Group memberships	Connectedness	0.07	0.02 F (1, 3370) = 64.81, $p < 0.001$	0.16 (0.02)*
	Well-being	0.18	.004 F (1, 3421) = 15.98, $p < 0.001$	0.12 (0.03)*
Connectedness	Well-being	0.19	0.02 F (1,3354) = 93.04, $p < 0.001$	0.25 (0.03)*

*$p < .001$

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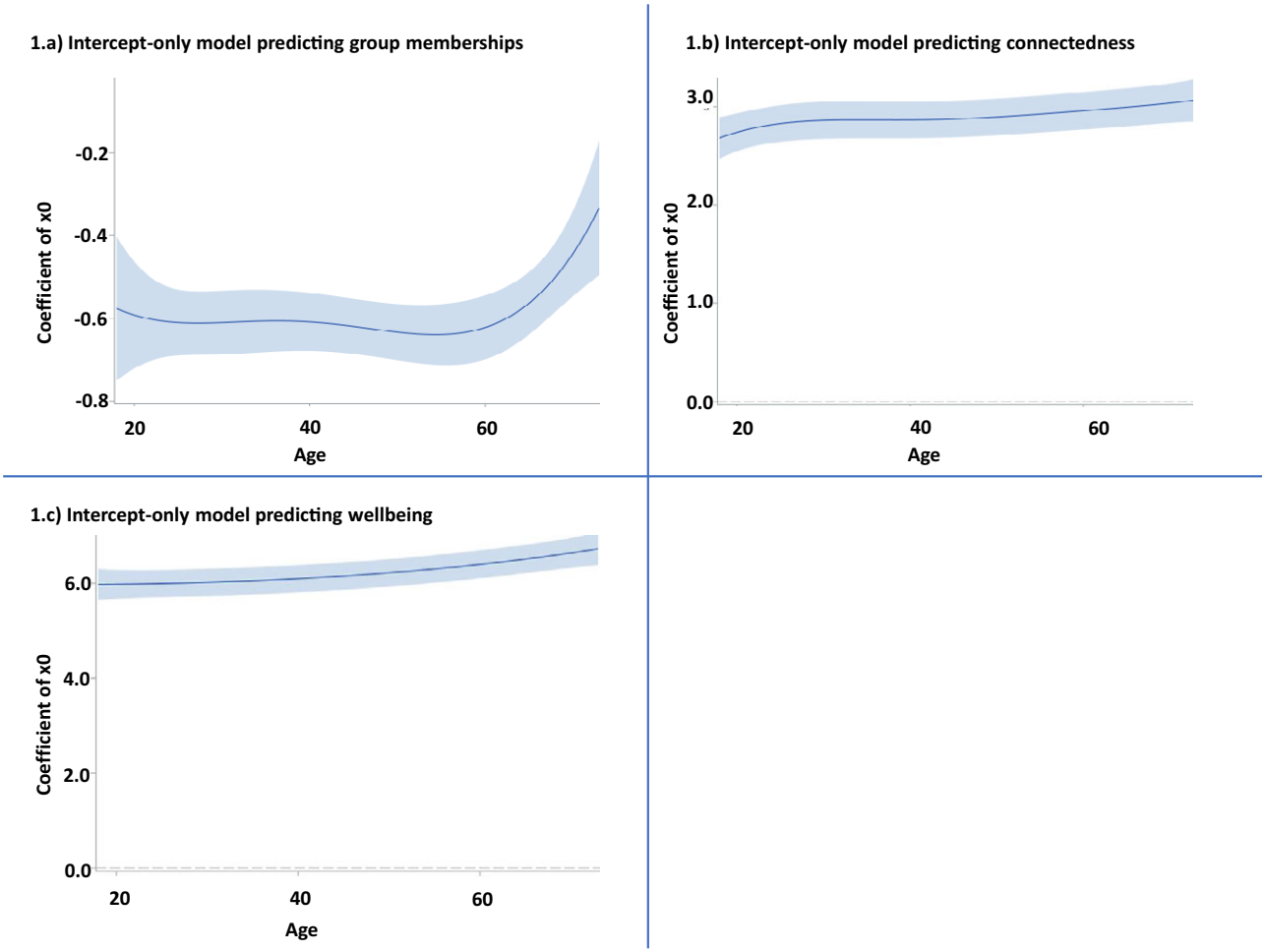

Figure 1. Intercept-only TVEM illustrations. Figure includes the depiction for the effect of age on group memberships (a), on connectedness perceptions (b), and on well-being (c). Note that a Poisson distribution was specified when conducting the intercept-only model for the group memberships variable to represent the count-related nature of the data. Normal distributions were specified for all other models.

point. CIs widen considerably when approaching the youngest or oldest ages from the present sample. This "fanning-out" pattern emerged because estimates at any time point are constrained by estimates before and after that time point and because several ages at the highest and lowest range in the sample had smaller age-specific samples (i.e., fewer people at specific age).

Coefficients for group memberships

Figure 2a reveals patterns in how the number of group membership contexts predicted subjective connectedness. The lowest coefficient was reached around age 30 ($B_{29.68}$ = 0.08; CI: 0.01, 0.15) and increased to the highest level at approximately age 60 ($B_{60.22}$ = 0.24; CI: 0.18, 0.30). Although group memberships remained a positive predictor of connectedness at all ages, the magnitude of the prediction for group memberships increased for participants in early adulthood through to those in middle-age. As indicated in the Supplemental Material, connectedness perceptions were also relatively higher for male participants (B[SE] = -0.01 [0.01], p = 0.02), those with lower COVID health concerns (B[SE] = -0.06 [0.01], p < 0.001), those with Canada as the country of residence (B[SE] = 0.09 [0.03], p = 0.002), and those with lower ratings of poor health (B [SE] = -0.16 [0.02], p < 0.001).

Figure 2b illustrates the time-varying effects of group memberships on well-being. The lowest coefficient increased from age 18 (B_{18} = 0.05; CI: -0.19, -0.28) to age 73 (B_{73} = 0.15; CI: -0.01, 0.36). Although age-varying comparisons did not reveal any points in time that differed from others, group memberships was not a significant predictor in early adulthood. Group memberships were a significant and positive predictor of well-being from the age of 36 (B_{36} = 0.09; CI: 0.01, 0.21) through older age, with age 69 being an indicative time point of older age with relatively narrow CIs (B_{69} = 0.14; CI: 0.06, 0.21). The only additional covariate with a significant association with subjective well-being was employment, indicating that those who were not unemployed rated higher well-being relative to those reporting unemployment (B[SE] = 0.73 [0.09], p < 0.001).

Coefficients for connectedness

Figure 3 reveals that connectedness was a significant and positive predictor of well-being throughout most ages included in the sample; the exceptions being ages 18–20 and ages 70–73 as a result of widening CIs. Although the highest coefficient was reached at about age 43 ($B_{43.55}$ = 0.26; CI: 0.17, 0.33), this value never fell beyond the CIs of other ages. When using connectedness as a

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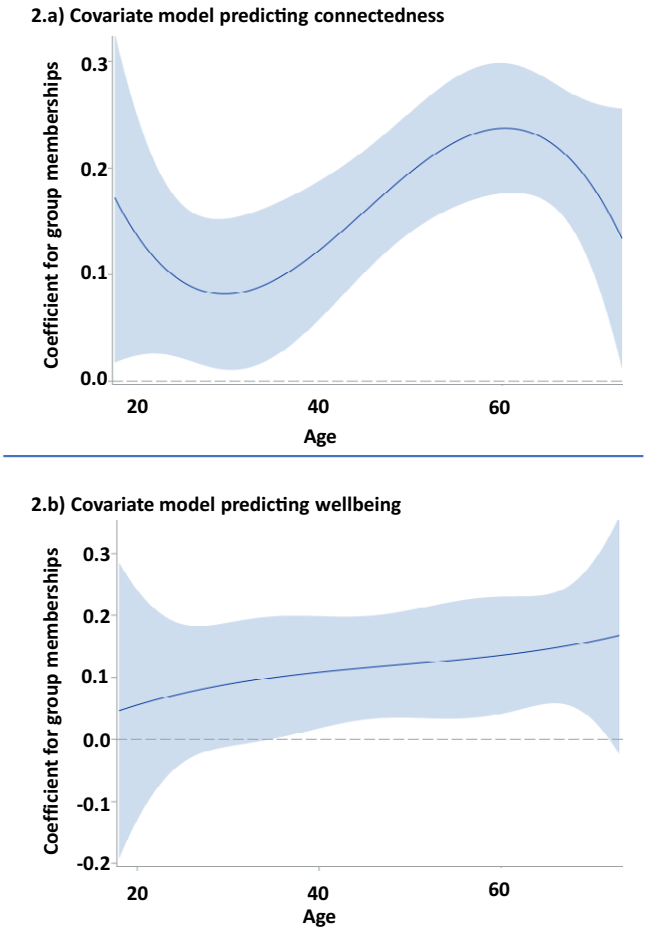

Figure 2. TVEM illustrations depicting coefficients for group memberships. TVEM demonstrate patterns in the association between group memberships and connectedness (a) and well-being (b).

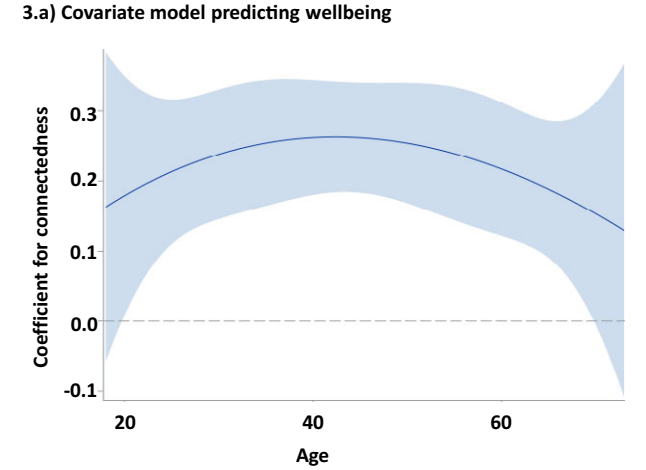

Figure 3. TVEM illustration depicting coefficients for perceived connectedness. TVEM demonstrate patterns in the association between the connectedness and well-being.

time-varying predictor, the additional variables that were predictive of well-being included unemployment (B[SE] = 0.72 [0.09], $p < 0.001$), and country of residence (B[SE] = -0.09 (0.04), $p = 0.04$).

Discussion

The current study explored the associations between small group memberships and well-being as well as perceived connectedness. Using regressions spanning all ages, results initially indicated small but significant associations whereby participants reporting small group memberships reported greater well-being and connectedness. Age-dependent patterns emerged when using TVEM analyses to probe variability, spanning participants from 18 to 73 years of age. Associations between group memberships and connectedness were positive and significant across all ages, but were strongest near older adulthood (i.e., age 60). Similarly, group memberships were only a positive predictor of well-being from the age of 36 on. Associations between connectedness and well-being were, meanwhile, positive and significant across most ages. All effects were predominately small to moderate in magnitude but were drawn from a large, stratified cross-sectional sample. These findings support theory regarding the universal value of group memberships and connectedness while also indicating that the salience of community groups may be especially strong for people currently in middle to older age.

Perhaps the most notable consideration when interpreting results is that these data were collected at a single point in time. The cross-sectional nature of this sample leaves open several interpretations regarding the potential sources of age-dependent variability in effects, including developmental and generational explanations. The introduction to this article highlighted plausible age-related changes in the social or psychological mechanisms linking group memberships with well-being and connectedness. Existing theories about groups in older age, for example, highlight how groups are a source of social participation that maintains cognition in older age (e.g., Glei et al., 2005), and provide a resilient social identity during common transitions in older age (e.g., retirement; Haslam et al., 2019). Whereas such arguments are appealing, generational explanations cannot be ruled out. Each age within the sample is subject to unique experiences, norms, or expectations about community group memberships.

An example of potential age differences relating to generational experiences is that adolescents and emerging adults have been exposed to a wide spectrum of groups and organizations by virtue of technological changes (i.e., social media, online gaming). Theorists posit that this shift in the range of physical and virtual group contexts necessitates differing approaches to theorize about social context (e.g., modifying socioecological theory; Navarro & Tudge, 2022). As such, there are plausible age differences involving how people at varying ages currently experience communities. Because it is not possible to determine with the present data whether the source of significant effects is a developmental change or a generational difference, these findings can at this point only be considered as *age differences* and as opposed to *age-related changes*.

Limitations and Future Directions

Three key considerations are relevant when interpreting findings. First, data were collected during the summer of 2020, which was a period of time including mandates for isolation in many regions. Indeed, an emerging body of evidence highlights the consequences of COVID-19 disease and isolation policies within different age groups (e.g., Birditt et al., 2021; Krendl & Perry, 2021). The present analyses did not focus on examining how COVID-19 experiences influenced the magnitude of the associations being targeted; instead, analyses addressed relevant contextual variables as

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covariates. Analyses included relevant covariates that represent geographical location and COVID-related health risks to ensure that findings were robust to the pandemic context. Nevertheless, the circumstances surrounding COVID likely shaped participants' social contexts substantially, such as by reducing the number and intensity of connections with groups. One example of the role of these covariates is evident in how connectedness perceptions were greatest for those from Canada and for people with comparatively lower perceptions of COVID risks to personal health. Because it is difficult to know whether or when similar isolating and threatening social conditions will be repeated in the future, one caution is that the nature and magnitude of associations from the present study may not generalize outside of isolation circumstances.

Second, the number of people reporting group memberships was descriptively low, with more than 50 per cent of the sample reporting no community group memberships. This frequency does, however, resemble other investigations with similar measures (e.g., 41% of sample with no community group memberships; Cruwys et al., 2013). Because participants completed this item by reporting group memberships by context (i.e., presence or absence of group memberships in varying contexts), it is also plausible that participants belonged to more than one group in a context, constraining the range in responses. Researchers should develop more sensitive group membership tools that capture the breadth and intensity of memberships across the lifespan. Furthermore, one interesting future direction would be to probe the moderating role of group context or other qualities of groups within TVEM. Such analyses with large samples may examine whether time-varying associations between group memberships and well-being are further moderated by group type, group size, amount of group interaction, or strength of social identity.

Third, readers should consider sample size limitations for the present investigation. Practically, a strength of this investigation was the large absolute sample size of nearly 4,000 participants and stratification of the sample across ages. Still, the broad age range meant that age-specific samples sizes were under-powered for certain ages. Although this investigation was adequately powered to identify age-related variability in associations: (1) the low sample sizes at certain ages make those findings less reliable (e.g., wide CIs at youngest and oldest ages), and (2) the relatively low sample size limited the opportunity to conduct more sophisticated analyses (e.g., moderation analyses). Future researchers should leverage larger and nationally representative data sets to further probe these associations. Such large-scale data would improve precision and would allow use of tools such as weighted TVEM, which can weight each age-specific sample to account for unequal probabilities of selection in large data sets while also accounting for clustering in schools or communities (see Jung et al., 2023).

Conclusion

This investigation leveraged an emerging methodology to better specify how the established links between group settings and well-being differ across ages. Descriptive findings from this study have theoretical implications relating to the role of age in group experiences, alongside practical implications regarding the potential value of targeting middle- and older-aged populations. Relevant interventions that could be adapted for specific age groups include whole-community interventions to instill identification with neighborhoods along with intervention approaches to prescribe community participation or group memberships in primary care (Martino, Pegg, & Frates, 2017). Such implications demand further developments from researchers further probing variability in the link between group memberships and key psychosocial outcomes. Investigations using TVEM analyses, alongside more sensitive measures of group memberships and longitudinal designs, are an important next step to specify the most salient forms of group memberships and probe whether developmental processes contribute to the time-varying effects identified in the current study.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/S0714980823000569.

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