Full Research Report

JSPR

Journal of Social and Personal Relationships
2024, Vol. 41(11) 3359–3384

DOI: 10.1177/02654075241264852
journals.sagepub.com/home/spr
Sage

Illness-related partner communication predicts better health, COVID, and social-contextual outcomes amid the COVID-19 pandemic: A longitudinal study of students with concealable chronic health conditions

M. Rosie Shrout[1], Emily M. Buehler[1], Daeun Grace Lee[2] and Megan E. Renna[3]

Abstract

In this longitudinal study of students with concealable chronic health conditions (CCHCs), we applied components of interpersonal disclosure process models to investigate how illness disclosures and perceived partner responsiveness conferred health and social benefits during the COVID-19 pandemic. Students with CCHCs and in relationships completed online surveys at the beginning, middle, and end of the academic year in which they returned to campus amid the COVID-19 pandemic (n_{Time1} = 101, n_{Time2} = 52, n_{Time3} = 54). Mixed models showed students with greater illness disclosures and perceived partner responsiveness had better physical health, engaged in less health-compromising behaviors, felt less worried and stressed about the COVID-19 pandemic, and experienced lower illness-related stigma, discrimination, and social isolation. Over time, students' greater illness self-disclosures predicted lower health-compromising behaviors and illness-related discrimination. Notably, perceived partner responsiveness connected greater illness self-disclosures to better health, COVID-related, and

[1]Purdue University, USA
[2]Colorado Mesa University, USA
[3]University of Southern Mississippi, USA

Corresponding author:
M. Rosie Shrout, Human Development and Family Science, Center on Aging and the Life Course, Purdue University, 610 Purdue Mall, West Lafayette, IN 479097, USA.
Email: shrout@purdue.edu

social-contextual outcomes. These findings demonstrate the health and social benefits of talking openly about concealable illnesses with partners and, in turn, feeling cared for, validated, and understood amid the COVID-19 pandemic. This study provides new evidence on relational pathways to better social and health outcomes among those with heightened health risks.

Keywords
chronic illness, communication, relationships, stigma, well-being

Introduction

Chronic health conditions are among the leading causes of death and disability in the United States (Bauer et al., 2014). One in two American adults has at least one psychological or physical chronic health condition, and a quarter of adults are living with multiple chronic health conditions (Ward et al., 2014). These health conditions often have prolonged durations that do not resolve spontaneously and are rarely cured, such as autoimmune diseases, ADHD, and diabetes. Many of these health conditions are also concealable, meaning the symptoms are not immediately apparent and can be hidden from others, termed concealable chronic health conditions (CCHCs). This concealability, or invisibility, poses additional challenges to their health, social connectedness, and well-being. Indeed, individuals may hide their illnesses from others, go unnoticed or untreated to avoid the label or stigma, and feel isolated (Link & Phelan, 2006).

Among college students, CCHCs are not only one of the top reasons students struggle academically, but they also increase risks for physical health problems, substance use and other health-compromising behaviors, and discrimination (American College Health Association, 2019; Shrout & Weigel, 2021, 2022). Compared to those without chronic conditions, students with CCHCs reported greater psychological distress and social isolation (Livneh & Antonak, 2005; Mullins et al., 2017). On top of managing their symptoms and associated social challenges, students with CCHCs have also been navigating the COVID-19 global pandemic. These students are a vulnerable population with elevated health risks that can be devastating upon contracting COVID-19. The pandemic itself posed psychological and physical consequences: psychiatric symptoms and clinical diagnoses rose during the pandemic, and individuals in 2020 were three times more likely to be diagnosed with a depressive disorder, anxiety disorder, or both than they were in 2019 (Twenge & Joiner, 2020). During the pandemic, college students' physical activity and academic performance decreased, while their substance use, disordered eating, insomnia, and distress increased (Huckins et al., 2020; Kowalsky et al., 2021).

Talking openly about illness concerns and symptoms is essential to receiving care and social support, especially from romantic partners, a person's closest relationship and primary source of social support (Pietromonaco & Collins, 2017). Indeed, college students' relationships are central predictors of health and well-being (Braithwaite et al., 2010). Relationships protect health during stress, particularly when partners talk openly

about their stress and feel cared for (Shrout, 2021). As discussed in interpersonal disclosure process models, self-disclosure and perceived partner responsiveness are key to improved physical, behavioral, and social outcomes (Chaudoir & Fisher, 2010; Laurenceau et al., 2004; Manne & Badr, 2008). Self-disclosure in relationships occurs when people share personally relevant thoughts and information with their partners. Such self-disclosures allow individuals to express their thoughts and feelings and, in turn, feel supported, understood, and cared for, known as perceived partner responsiveness (Laurenceau et al., 2004; Reis & Shaver, 1988). Interpersonal disclosure process models conceptualize perceived partner responsiveness as a key mediator connecting self-disclosure to better health and social outcomes. Thus, as individuals share personal thoughts and information, they feel more cared for and understood, and in turn, experience stronger social connection and better health (Laurenceau et al., 2004; Reis & Shaver, 1988). This mediation process is a core feature in early (Reis & Shaver, 1988) and continued developments of interpersonal process disclosure models in romantic relationships (Laurenceau et al., 2004), along with those focused on individuals with concealable identities (Chaudoir & Fisher, 2010).

Research applying interpersonal disclosure processes models to chronic illness contexts has shown that greater self-disclosure and subsequent feelings of partner responsiveness have been associated with better illness management, lower distress, and improved social outcomes (Manne & Badr, 2008; Manne et al., 2004). In a longitudinal study of individuals with CCHCs, increased illness-related communication, including self-disclosure, predicted greater dyadic coping and relational well-being (Shrout, Weigel et al., 2023). For people with CCHCs, feeling supported, understood, and cared for can enhance well-being, promote behavioral health, and decrease stigma and isolation (Chaudoir & Fisher, 2010; Checton & Greene, 2012). Extensions and applications of interpersonal disclosure process models suggest that illness-related communication is especially important for those with chronic conditions, and those with more severe conditions may benefit the most from having open communication and responsive partners (Ferraris et al., 2023). However, disclosing health-related information carries risks. Individuals could receive backlash, rejection, and discrimination (Chaudoir & Fisher, 2010). In one study, individuals reported feeling fearful and uncertain when sharing illness-related information, and the invisibility further reduced their willingness to self-disclose (Blixen et al., 2016). In line with interpersonal disclosure process models, it is therefore essential for individuals to perceive their partner as responsive after self-disclosing to confer relational and health benefits (Laurenceau et al., 2004; Reis & Shaver, 1988).

For students with CCHCs returning to campus while navigating a global pandemic, talking openly about their illness to partners and, in turn, feeling cared for, validated, and understood may help promote their health and social outcomes. In the year returning to campus amid the pandemic, the concealability or invisibility of their health conditions may have intensified an already stressful transition, adding to their perceived stigma, shame, and vulnerability. Many individuals with chronic illness often feel like a burden when involving their partners (Jeon et al., 2010). Yet, hiding symptoms or holding back concerns leaves them vulnerable to distress, social

isolation, and poorer health (Johnson et al., 2014; Manne et al., 2007; Quinn & Earnshaw, 2011). Disclosing to a partner and feeling cared for may have promoted beneficial effects, helping them across the transition to their new reality. Given these social and health challenges students with CCHCs face, it is important to examine how they fared returning to campus amid a global pandemic that puts their health at greater risks. Addressing how self-disclosure and perceived partner responsiveness promote health, COVID-related, and social-contextual outcomes can identify how romantic relationships—a key health determinant—protect health in this vulnerable population.

We therefore applied components of interpersonal disclosure process models to investigate how illness disclosures and perceived partner responsiveness conferred health and social benefits in the year returning to campus amid the COVID-19 pandemic. We examined concurrent and prospective associations between students' illness disclosures, perceived partner responsiveness, and various health, COVID-related, and social-contextual outcomes across the academic year. Given the widespread adverse effects of CCHCs on students' daily lives, as well as the importance of illness-related communication across social and health outcomes (Checton & Greene, 2012; Shrout & Weigel, 2021, 2022), we assessed multiple aspects of their health and social well-being. These outcomes included physical health problems and health-compromising behaviors (health outcomes), COVID-related stress and worry (COVID-related outcomes), and illness-related stigma, discrimination, and social isolation (social-contextual outcomes). We also assessed the characteristics and nature of students' CCHCs.

We conducted this study during the 2021-2022 academic year—the second year of the pandemic—because this was a unique time for students, especially those with CCHCs, as they returned to campus and/or in-person classes for the first time since early 2020. During the study and through May 2023, the World Health Organization (WHO) and U.S. Centers for Disease Control and Prevention (CDC) classified COVID-19 as a pandemic with emergency declarations (Scobie et al., 2023; Silk et al., 2023). To address how students fared as they returned to campus and across the year, they completed three surveys. The first survey occurred during the Fall 2021 semester—a time of heightened health-related vulnerability because this was the first semester all students returned to campus. A university mask mandate was in place to reduce COVID risks. The second survey occurred early in the Spring 2022 semester, which coincided with the Omicron variant spike and rapid increases in COVID-19 cases, contributing to substantial health risks for those with CCHCs. The third survey took place at the end of the Spring 2022 semester when COVID-19 rates declined and the university lifted its mask mandate, a lower-risk time compared to the timing of the prior two surveys.

To understand the nature of students' CCHCs and their experiences across the academic year, we assessed characteristics of their CCHCs, including symptom severity, daily management, and length, and explored how their CCHC and the timing in the pandemic affected their relationships and health. We hypothesized that individuals' health, COVID-related, and social-contextual outcomes would change over time. We expected that students' outcomes would fare the worst at the beginning of the academic year and during the mid-year Omicron spike because of the associated health risks returning to campus and with the increased COVID rates, followed by improvements at the

end of the academic year with COVID rates declining. Applying aspects related to interpersonal disclosure process models, we also hypothesized that students' greater illness self-disclosures would predict greater perceived partner responsiveness to those disclosures concurrently and over time. In turn, perceiving greater responsiveness would predict better health, COVID-related, and social-contextual outcomes concurrently and over time. In line with interpersonal process disclosure theories, we also expected that illness self-disclosures would predict better outcomes indirectly through greater perceived partner responsiveness.

Method

Participants

Participants were individuals with diagnosed CCHCs who were in romantic relationships ($n_{Time1} = 101$, $n_{Time2} = 52$, $n_{Time3} = 54$). The study took place at a large university in [city name blinded], a small city in the Midwestern United States. At wave 1, participants' ages ranged from 18 to 24 years old ($M = 19.87$, $Mdn = 20.00$, $SD = 1.62$). The sample included 74.7% of people who identified as women, 20% identified as men, and 5.3% identified as non-binary or genderfluid. Most individuals were White (74.3%), followed by Asian or Asian American (14.9%), multi-ethnic or multi-racial (5%), Black or African American (3%), and Latinx/Hispanic (3%). Most individuals were in dating relationships (94.4%), followed by engaged (4.5%) and marital (1.1%) relationships. Relationship length ranged from 1 month to 5 years ($M = 1.37$ years, $SD = 1.31$). Most individuals were in a relationship with someone of a different gender (96.6%) and identified as heterosexual (78%), followed by bisexual (18%), asexual (2%), gay or lesbian (1%), and queer (1%). Students were mostly freshmen (39.9%) and seniors (34.1%) followed by juniors (13.6%) and sophomores (11.4%). Most students worked part time (48.6%), followed by not working for pay (40.5%), and working full time (10.8%).

Study design

Participants were recruited as part of a longitudinal study on students with CCHCs returning to campus amid the COVID-19 pandemic (i.e., the 2021-2022 academic year). The study recruitment and consent forms, along with instructions throughout the questionnaire, were specific to understanding how having a nonvisible, or concealable, health condition affects academics, health, and relationships while returning to campus amid the COVID-19 pandemic. Because the current study addressed how disclosure and responsiveness within a romantic relationship conferred health and social benefits, we focused on those participants from the larger study who indicated they were in a romantic relationship. Being in a romantic relationship was not an eligibility criterion for the larger study. Participants were initially recruited from a subject pool. Interested individuals completed a screening questionnaire that included a list of conditions from which they could select any diagnosed CCHCs (e.g., autoimmune disease, endocrine, psychiatric) and the option to specify a condition not listed.

Eligible participants completed surveys at the beginning, middle, and end of the academic year, described above. Briefly, the first survey was completed in the Fall 2021 semester (September, October, and November 2021)—the first semester all students returned to campus and were required to wear masks. They completed the second survey at the start of the Spring 2022 semester (January and February 2022), which coincided with the COVID-19 Omicron variant spike. The third survey was completed at the end of the Spring 2022 semester (April and May 2022) when the university lifted the mask mandate.

For between-person longitudinal analyses, an a priori power analysis suggested that 44 participants would be necessary to provide power of b = .80 at the alpha = .05 level of significance (effect size = .15, number of measurements/waves = 3; Faul et al., 2007). Participants received research participation credits for completing the first survey and e-gift cards for completing the second and third surveys. All procedures were approved and deemed exempt by the (blinded university) Institutional Review Board, approval number (blinded).

Measures

CCHC characteristics. The type, length, number, and severity of individuals' CCHCs were assessed. Respondents selected the type of CCHC they had and were allowed to check all that apply and write in additional CCHCs. They reported how long they had been diagnosed with their CCHCs. We also coded their total number of diagnosed CCHCs. Students indicated their CCHC symptom severity over the past two weeks (1 = *not at all*, 5 = *extreme*) and the degree of daily management (1 = *none*, 5 = *a great deal*). We also asked how often their CCHCs interfered with academics (1 = *never*, 5 = *always*) and if they received accommodations from the campus Disability Resource Center for their CCHCs (yes/no). They also indicated if they had ever been diagnosed with or been vaccinated against COVID-19. At the end of each survey, participants were shown the following open-ended prompt: "Is there anything else you would like to tell us about how your illness and/or the COVID-19 pandemic impacts your social life with family or friends, romantic relationship, or academics?" This prompt was intended to encourage participants to share any other information related to their CCHCs and the pandemic. Participants were presented with an essay box to type their response following each prompt.

Illness-related communication

Illness-related disclosures. Illness-related self-disclosure was assessed with Manne et al. (2014) illness-related self-disclosure measure. Three items assessed how much respondents disclosed thoughts, feelings, and information about the health condition to their partners (e.g., "How much have you disclosed your feelings about the health condition?"). Items were rated on a 7-point Likert scale (1 = *not at all*, 7 = *very much*). The items were averaged together, with higher scores indicating greater illness-related self-disclosures (αs = .89 to .93).

Perceived partner responsiveness to illness-related disclosures. We used Manne et al. (2014) illness-related perceived partner responsiveness to disclosures measure. Three items assessed how accepted, understood, and cared for respondents felt when they disclosed thoughts, feelings, and information about the health condition to their partner (e.g., "Thinking about when you have talked to your partner about thoughts, feelings, and information regarding the health condition, to what degree have you felt accepted by your partner?"). Items were rated on a 7-point Likert scale (1 = *not at all*, 7 = *very much*) and were averaged together, with higher scores indicating greater perceived partner responsiveness to illness-related self-disclosures (αs = .82 to .93).

General health outcomes

Physical health problems. The Physical Health Questionnaire (Schat et al., 2005) assessed physical health problems over the past two weeks. Consistent with past research separating double-barreled items (Shrout & Weigel, 2021), a total of 17 items were used to assess somatic symptoms of physical health over the past two weeks (e.g., "How often have you experienced headaches?" and "How often did you get an upset stomach?"). Items were rated on a 7-point scale (1 = *not at all*, 7 = *all of the time*) and averaged so that higher scores indicate more physical health problems (αs = .88 to .92).

Health-compromising behaviors. The 15-item health-compromising behaviors measure (Shrout & Weigel, 2018) was used to assess how often participants engaged in risky health behaviors over the past month. The measure is based on items from the CDC Behavioral Risk Factor Surveillance System that assesses risky behaviors, such as drug and alcohol use (e.g. "Drinking alcohol," "Using marijuana," and "Drinking alcohol in combination with drug use"), exercise (e.g., "exercising to the point of exhaustion), eating behaviors (e.g., "binge eating"), and sexual behaviors (e.g., "Having sex under the influence of drugs"). Response options ranged from 1 (never) to 5 (most days) and were coded so that higher scores indicate more frequent engagement in health-compromising behaviors (αs = .77 to .90).

COVID-related outcomes

COVID-related stress. We adapted the four items from the Perceived Stress Scale-4 (Cohen et al., 1983).[1] Respondents were instructed to answer questions while thinking about the return to in-person classes amid the COVID-19 pandemic (e.g., "How often have you felt that you were unable to control the important things in your life?" and "How often have you felt difficulties were piling up so high that you could not overcome them?"). Response options ranged from 1 (not at all) to 7 (all of the time) and were coded and averaged so that higher scores indicate greater COVID-related stress (αs = .76 to .79).

COVID-related worry. We used an adapted version of the 8-item Penn State Worry Questionnaire – Abbreviated (Hopko et al., 2003). Respondents were instructed to select responses while thinking about the return to in-person classes amid the COVID-19 pandemic (e.g., "I have been worrying all of the time" and "My worries overwhelmed

me.") Response options ranged from 1 (not at all) to 7 (all of the time) and coded so that higher scores indicate greater COVID-related worry (αs = .95 to .96).

Social-contextual outcomes

Illness-related anticipated stigma. We used the 12-item Chronic Illness Anticipated Stigma Scale (Earnshaw et al., 2013). Respondents were asked to rate the likelihood of encountering several stigmatizing experiences in the future because of their health condition on a scale ranging from 1 (very unlikely) to 5 (very likely). For example, "A friend or family member will think that your illness is your fault." Higher scores indicate greater illness-related anticipated stigma (αs = .92 to .95).

Illness-related discrimination. We used the 10-item Stigma Experiences Scale of the Inventory of Stigmatizing Experiences to assess illness-related discrimination (often called enacted or experienced stigma; Stuart et al., 2005). On a scale from 1 (never unlikely) to 5 (often), respondents rated how often they encounter discriminating experiences because of their health condition (e.g., "How often are you teased, bullied, or harassed because of your health condition?" and "How often have you felt that you have been treated unfairly or that your rights have been denied because of your health condition?"). Higher scores indicate greater illness-related discrimination (αs = .89 to .94).

Social isolation. We used the 6-item Patient-Reported Outcomes Measurement Information System social isolation scale (Pilkonis et al., 2016). Using a scale from 1 (strongly disagree) to 5 (strongly agree), respondents rated the degree to which they felt avoided, excluded, detached, disconnected from, or unknown by others (e.g., "I feel left out" and "I feel isolated from others"). Higher scores indicate greater social isolation (αs = .94).

Statistical analyses

We first conducted preliminary analyses to better understand students' relationship and health experiences related to their CCHC and the pandemic. We examined descriptive characteristics of individuals' CCHCs, including the symptom severity, daily management, and length, as well as bivariate correlations between study variables. In addition to these descriptive analyses, we reviewed students' responses to the open-ended question about how their CCHC and pandemic affected their relationships, health, and academics. Although not a formal systematic analysis, these examples provide depth to the descriptive statistics.

Prior to hypothesis testing, we also assessed if students' relationships ended during the study, which showed eight students at wave 2 and 15 students at wave 3 were no longer in a relationship. Chi-square tests of independence showed no association between relationship dissolution and the study wave ($p = .41$). No students whose relationship ended began a new relationship; thus, students reported only on one relationship during the study. There were no differences in the outcome variables by relationship dissolution ($ps > .19$). Sensitivity analyses also showed the study's results were no different when only including students in a relationship at all three waves; thus, to maximize data and the

sample size, we included all data from waves in which students were still in a relationship. We also assessed if missing data across waves differed by key socio-demographic data, which showed men were more likely to have missing data compared to women and non-binary individuals at wave 2, $\chi 2(2) = 16.73$, $p < .001$. No other variables differed across waves ($ps > .06$). Gender was included as a covariate in the analyses, along with the number of CCHCs, CCHC severity, and wave, described below.

We then used mixed models to address the study hypotheses. This modeling approach accounted for the non-independence in participants' data (i.e., an individual's scores on the same variable over time). An additional strength of mixed models is that it accounts for missing data by maximizing the use of existing data and includes all participants in the analyses, regardless of missing data points (Brauer & Curtin, 2018). The mixed models used restricted maximum likelihood estimation, and a subject-specific random effect captured the within-subject correlation.

We first tested the hypothesis that the health, COVID-related, and social-contextual outcomes would change over the academic year (i.e., the three waves). Then we tested the hypothesis that greater illness self-disclosures would predict greater perceived partner responsiveness to disclosures, and that the illness communication variables would be associated with better outcomes concurrently and over time. For the over time analyses, we tested lagged effects of illness self-disclosures and perceived partner responsiveness to disclosures on each subsequent health, COVID, and social-contextual outcome, controlling for the previous outcome. Thus, the previous wave's predictor (e.g., wave 1) was used to predict the subsequent wave's outcome (e.g., wave 2), controlling for the previous wave's outcome (e.g., wave 1). We also examined if the effects of illness disclosures and perceived partner responsiveness differed by wave by specifying two-way interactions; non-significant interactions were removed when interpreting main effects. Last, using the MLmed macro for SPSS (Rockwood & Hayes, 2017), we tested the hypothesis that illness-related disclosures would be linked indirectly to each outcome through perceived partner responsiveness. The macro uses mixed models to account for multiple waves and missing data tests; it tests between-person indirect effects using robust standard errors (REM estimation) with Monte Carlo simulations generating 95% confidence intervals (CIs) and 10,000 resamples (Rockwood & Hayes, 2017). The indirect effects were considered significant if the CIs did not include zero. Across all models, we included the number of CCHCs, CCHC severity, gender, and wave as covariates. All analyses were done in SPSS version 29. Analytic code and data are available upon request from the first author.

Results

Descriptive analyses

Most participants had one diagnosed CCHC (61.4%), followed by two CCHCs (27.7%), three CCHCs (7.9%), and four to five CCHCs (3%). Participants self-reported the following types of CCHCs: psychiatric (59.4%), neurologic (39.6%), digestive (11.9%), autoimmune (7.9%), cardiovascular (7.9%), chronic pain (7.9%), other (e.g., chronic

sexually transmitted infections; 6%), and rheumatologic (2%). On average, participants were diagnosed with their CCHCs 4.40 years ago ($SD = 4.73$ years), with 66% diagnosed within the last four years, followed by 23% diagnosed between 5 and 10 years ago, and 11% diagnosed more than 10 years ago. At wave 1, their symptom severity in the last two weeks was on average 3.04 ($SD = 0.96$) on a 1-5 scale, with most patients stating moderate (47%) and severe (23%) symptom severity. Patients' average daily management was 3.17 ($SD = 0.94$) on a 1-5 scale, with most patients stating somewhat (42%) to quite a bit (29%) of daily management. Most students rarely (28.5%) or sometimes (35.7%) told their friends about their CCHC, and 69% of students very rarely told their professors about their CCHC. Most individuals reported that their CCHCs often (38.4%) or sometimes (23.2%) interfered with their academic performance (on a 1-5 scale: $M = 3.29$, $SD = 1.18$). Across the waves, less than 10% of individuals received accommodations from the campus Disability Resource Center for their CCHC. Nearly all individuals were vaccinated against COVID-19 (89.1%–94.5% across the waves). About half of individuals reported that they had never been diagnosed with COVID-19 (50.5%–54.5%), one third reported a past COVID-19 diagnosis (31.7%–38.9%), and 7.4%–17.8% reported previously having COVID-19 symptoms but were not tested.

Table 1 correlations and descriptives represent all three waves of data. Except for the correlation between health-compromising behaviors and COVID-related worry, there were significant positive correlations among the various health, COVID-related, and social-contextual outcomes ($ps < .05$). For the illness communication variables, greater disclosures was correlated was greater perceived partner responsiveness to disclosures ($p < .001$). Greater illness disclosures was associated with fewer health-compromising behaviors and lower social isolation ($ps < .05$), and greater perceived partner responsiveness to disclosures was negatively correlated with each health, COVID-related, and social-contextual outcome ($ps < .001$). Preliminary mixed models on the predictors also showed that illness-related self-disclosures ($p = .64$) and perceived partner responsiveness ($p = .86$) did not change over time.

Participants' answers to the open-ended question about how their CCHC and/or the COVID-19 pandemic affected their social life, relationships, or academics showed five common response categories: delayed treatment for their health condition, exacerbated health condition symptoms, worse relationships with professors and academics, struggling social relationships, and support from their romantic partners (see Table 2 for example quotes). Students reported having health-related setbacks and not seeking out care despite needing it. They also stated that their health conditions were worse during the pandemic and that their symptoms increased. Students reported worse academics and relationships with professors and felt not all professors were understanding. These students did not feel comfortable telling professors about their health condition, leading to missed classes and poorer grades. Students also felt excluded and isolated because of their health condition, and that their health condition interfered with their close relationships. For instance, one student shared how a past romantic relationship and friendships ended because of their health condition during the pandemic. Last, students shared that receiving support from partners provided some relief during the pandemic.

Table 1. Correlations among study variables.

	1	2	3	4	5	6	7	8	9	10
1. Physical health problems	—									
2. Risky behaviors	.16*									
3. COVID-related worry	.32***	.06								
4. COVID-related stress	.34***	.18*	.63***							
5. Illness-related stigma	.30***	.33***	.28***	.26***						
6. Illness-related discrimination	.43***	.24**	.41***	.39***	.61***					
7. Social isolation	.30***	.24**	.42***	.44***	.55***	.61***				
8. Illness self- disclosures	−.03	−.18*	−.05	−.10	−.10	−.08	−.23**			
9. PPR to disclosures	−.32***	−.39***	−.28**	−.28***	−.43***	−.34***	−.37***	.31***		
10. Illness symptom severity	.40***	.12	.22**	.34***	.28***	.34***	.33***	.06***	−.17*	—
Mean (*SD*)	3.63 (1.13)	1.66 (0.51)	3.95 (1.59)	3.89 (1.50)	1.69 (0.71)	2.15 (0.89)	2.76 (1.17)	5.88 (1.27)	6.44 (0.98)	2.94 (0.92)
Range	1–7	1–5	1–7	1–7	1–5	1–5	1–5	1–7	1–7	1–5

Note. Correlations and descriptives represent all three waves of data.
PPR: perceived partner responsiveness.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 2. Common responses to the open-ended question about the impact of CCHCs and the COVID-19 pandemic.

Response category	Example quote
Delayed treatment	
Health-related setbacks	"Covid messed with my treatment, setting me back to the beginning after over a year of treatment, since I couldn't leave the house to get it. I've had to get 4 surgeries"
Not seeking out care despite needing it	"Although I was not hospitalized for my condition this semester, I feel like I qualified (by severity of symptoms) or should have gone to the hospital"
Exacerbated health condition and increased symptoms	"My illness also makes me think every minor symptom of illness is a catastrophic failure and will have a massive impact on my already isolated life on campus"
	"The pandemic (especially lockdown) was extremely difficult for me because of my mental illnesses and contributed to a great deal of hopelessness"
	"covid made my symptoms increase"
Worse academics and relationships with professors	
Unexcused class absences	"It can be frustrating because often professors require doctor's notes for sick days, but on days when my health condition is so bad I have to spend the day in bed this would not be something worth going into the doctor for and thus I get no excuse to miss class"
Not all professors were understanding	"Although some of my professors were understanding of my health condition preventing me from progressing at the established pace for the course, not all were. And I felt like it was largely subjective which classes I was fairly graded in"
Not comfortable telling professors	"I feel that I am often scared to talk to professors about my illnesses and if I am struggling in a class because of them. I Know they are not excuses, but I still wish professors would be more approachable and understanding"
Struggling social relationships	
Feeling excluded and isolated because of health condition	"I often feel that many people don't fully understand me. Recently, I feel as though I am always there for everyone else and no one is ever there for me, even though I may be the one that needs support the most"
Health condition interfered with close relationships	"As for my condition affecting my relationships, sometimes people get frustrated with me. I Think it is a big part of me and my personality. Taking my medicine is beneficial for learning and school, but at times makes me feel like it takes away my personality"

(continued)

Table 2. (continued)

Response category	Example quote
Ending of romantic relationships and friendships	"Before my current relationship, I was with a partner for over a year. He broke up with me because of my extremeness with my depression and anxiety during the peak times of COVID. He couldn't deal with my mood swings and anger anymore so he broke up with me. We shared the same friend group and they chose to stay around him. I no longer talk to him or that friend group anymore"
Support from romantic partners	"I am grateful to my romantic partner for staying with me and making me feel better" "My romantic relationship has helped me gain happiness and comfortability with my loss"

Changes over time in health, COVID-related, and social-contextual outcomes

Multilevel growth curve models showed individuals' COVID-related stress $F(2, 43.32) = 4.32$, $p = .02$) and illness-related discrimination $F(2, 45.45) = 4.40$, $p = .02$) changed over time. COVID-related stress was higher at the beginning ($b = 0.77$, $SE = 0.27$, $p = .01$) and middle ($b = 0.64$, $SE = 0.26$, $p = .01$) of the academic year compared to the end of the academic year. There were no differences in COVID-related stress at the beginning and middle of the year ($p = .54$). Illness-related discrimination was higher mid-year during the Omicron surge compared to the beginning ($b = 0.27$, $SE = 0.12$, $p = .03$) and end ($b = 0.33$, $SE = 0.12$, $p = .01$) of the year; there were no differences in illness-related discrimination at the beginning and end of the year ($p = .65$). Health-compromising behaviors, COVID-related worry, illness-related stigma, and social isolation did not change over time ($ps > .09$).

For covariates, compared to men, women reported greater physical health problems ($F[2, 90.66] = 8.00$, $p < .001$, $b = 0.86$, $SE = 0.25$, $p = .003$) and COVID-related worry ($F[2, 77.99] = 3.63$, $p = .31$, $b = 1.01$, $SE = 0.41$, $p = .04$). Individuals with greater symptom severity had greater physical health problems ($b = 0.39$, $SE = 0.08$, $p < .001$), COVID-related stress ($b = 0.40$, $SE = 0.13$, $p = .003$), illness-related stigma ($b = 0.14$, $SE = 0.07$, $p = .03$), and illness-related discrimination ($b = 0.22$, $SE = 0.08$, $p = .01$). No other covariates were significant ($ps > .05$).

Illness-related communication and the health, COVID-related, and social-contextual outcomes

Next, we examined concurrent and prospective effects of illness-related self-disclosures on perceived partner responsiveness to the disclosures as well as illness-related communication on each outcome. We also tested the indirect effects of illness disclosures on

each outcome through perceived partner responsiveness. Coefficients and standard errors are shown in Table 3.

Illness self-disclosures predicting perceived partner responsiveness. Concurrent analyses showed that individuals with greater illness-related self-disclosures also perceived their partner as more responsive to those disclosures (p = .004). Lagged analyses showed illness-related self-disclosures did not predict perceived partner responsiveness to disclosures over time (p = .74). The effects of illness-related disclosures on responsiveness to disclosures did not differ by wave (ps > .12). Other than previous perceived partner responsiveness (b = 0.38, SE = 0.10, p < .001), no covariates predicted responsiveness (ps > .08).

Illness self-disclosures and perceived partner responsiveness predicting each outcome. Perceived partner responsiveness to the disclosures, but not the illness disclosure itself (ps > .05), was associated with each health, COVID-related, or social-contextual outcome concurrently. Thus, individuals who perceived their partners as more responsive to illness-related disclosures also reported lower physical health problems (p = .03), health-compromising behaviors (p < .001), COVID-related worry (p = .03), COVID-related stress (p = .02), CCHC-related stigma (p < .001), CCHC-related discrimination (p = .003), and social isolation (p = .005). Concurrent effects of illness disclosures and perceived partner responsiveness did not differ by wave (ps > .05).

Prospective analyses showed greater illness self-disclosures were associated with lower illness-related discrimination over time (p = .04). Likewise, illness self-disclosures predicted fewer health-compromising behaviors over time, and the effects differed by wave (F[2, 52.07] = 6.04, p = .02). Illness disclosures at the beginning of the academic year were not associated with health-compromising behaviors mid-year (b = 0.06, SE = 0.05, p = .28). In contrast, greater self-disclosures mid-year predicted fewer health-compromising behaviors at the end of the academic year (b = −0.10, SE = 0.04, p = .01). Additionally, greater perceived partner responsiveness to the illness disclosures predicted lower physical health problems (p = .02) and illness-related stigma (p = .01) over time. There were no other significant lagged effects (ps > .13). No other prospective effects differed by wave (ps > .12).

Consistent with the preliminary analyses, for covariates, greater symptom severity was linked to greater physical health problems (bs = 0.29 to 0.30, SEs = 0.08 to 0.13, ps < .04), COVID-related stress (b = 0.36, SE = 0.14, p = .01), and illness-related discrimination (bs = 0.15 to 0.29, SEs = 0.08 to 0.11, ps < .05). Women reported more physical health problems (b = 1.05, SE = 0.26, p < .003) and COVID-related worry (b = 1.33, SE = 0.43, p = .008) than men. COVID-related stress was lower at the end of the academic year compared to the beginning and middle of the year (bs = −0.61 to −0.72, SEs = 0.26, ps < .03). Illness-related discrimination was higher mid-year compared to the beginning and end of the year (bs = 0.24 to 0.32, SEs = 0.11, ps < .03). Lagged perceived partner responsiveness predicted current perceived partner responsiveness (b = 0.38, SE = 0.10, p < .001). There were no other significant covariates (ps > .05).

Table 3. Illness communication on health, COVID-1related, and social-contextual outcomes.

	Outcomes: *b* (*SE*) or *F*							
Predictors	PPR to illness self-disclosures	Physical health problems	Risky behaviors	COVID-related worry	COVID-related stress	Illness-related stigma	Illness-related discrim.	Social isolation
Concurrent								
Illness self-disclosures	**0.12 (0.04)****	0.01 (0.05)	−0.03 (0.03)	−0.02 (0.10)	−0.03 (0.09)	0.001 (0.04)	0.002 (0.05)	−0.13 (0.07)
PPR to illness self-disclosures	—	**−0.20 (0.10)***	**−0.25(0.05)*****	**−0.36 (0.16)***	**−0.35 (0.14)***	**−0.27(0.06)*****	**−0.24 (0.08)****	**−0.34 (0.12)****
Lagged								
Illness self-disclosures	−0.02 (05)	−0.03 (0.07)	**−0.10 (0.04)***	−0.15 (0.13)	0.02 (0.12)	−0.02 (0.04)	**−0.12 (0.06)***	−0.07 (0.07)
PPR to illness self-disclosures	—	**−0.30 (0.12)***	−0.07 (0.06)	−0.23 (0.27)	−0.33 (0.24)	**−0.25 (0.09)***	−0.05 (0.13)	−0.18 (0.16)
Concurrent indirect effects (*SE*) and 95% [CI] for illness self-disclosures on each outcome through PPR								
	—	**−0.07 (0.04), [−0.16, −0.01]**	**−0.06 (0.03), [−0.11, −0.02]**	**−0.12 (0.06) [−0.26, −0.01]**	**−0.10 (0.05), [−0.22, −0.02]**	**−0.08 (0.03), [−0.15, −0.03]**	**−0.07 (0.03), [−0.14, −0.01]**	**−0.11 (0.05), [−0.21, −0.03]**

Note. Significant effects are bolded. Lagged effects control for the previous outcome. Indirect effects are at the between-person level.
CCHC: concealable chronic health condition; PPR: perceived partner responsiveness; Discrim.: discrimination.
*$p < .05$, **$p < .01$, ***$p < .001$.

Indirect effects of illness self-disclosures on each outcome through perceived partner responsiveness. Last, we tested the indirect effects of illness self-disclosures on each outcome through perceived partner responsiveness in the concurrent models, but not the lagged models given the non-significant lagged effects of illness self-disclosures on responsiveness to disclosures. As shown in Table 3, illness-related self-disclosures were linked indirectly to each health, COVID-related, and social-contextual outcome concurrently through perceived partner responsiveness to the disclosures. Accordingly, individuals who reported greater illness-related self-disclosures also perceived their partner as more responsive to those disclosures and, in turn, reported lower physical health problems, health-compromising behaviors, COVID-related worry, COVID-related, illness-related stigma, illness-related discrimination, and social isolation.

Post-hoc symptom severity moderation models

Extensions and applications of interpersonal disclosure process models have examined the illness context as a moderator in the disclosure process (Ferraris et al., 2023). It is possible that students with more severe CCHCs would benefit the most from having open communication and responsive partners. Accordingly, we explored how symptom severity moderated the effects of disclosure and PPR on the various outcomes concurrently and over time. Continuous variables and covariates were grand mean-centered to improve the interpretability of the intercepts; significant interactions were investigated using simple slopes at one standard deviation above and below the means for each continuous interacting variable (Aiken & West, 1991).

No concurrent moderation effects were shown ($ps > .10$), but prospective moderation analyses revealed significant PPR by symptom severity effects on subsequent health-compromising behaviors ($b = -0.12$, $SE = 0.06$, $p = .04$) and illness-related stigma ($b = -0.29$, $SE = 0.06$, $p = .002$). As shown in Figure 1A, individuals with more severe symptoms engaged in marginally fewer health-compromising behaviors over time if their partners were more responsive to disclosures ($b = -0.14$, $SE = 0.07$, $p = .06$). The link between PPR and health-compromising behavior was not significant for those with less severe symptoms ($b = 0.08$, $SE = 0.08$, $p = .29$). Also, among students with less responsive partners, health-compromising behavior engagement was higher they had more severe symptoms ($b = 0.22$, $SE = 0.08$, $p = .009$). As shown in Figure 1B, among students with more severe symptoms, illness-related stigma decreased over time if they perceived their partners as more responsive to their illness disclosures ($b = -0.31$, $SE = 0.11$, $p = .01$). Those with less responsive partners, however, had increased stigma over time if their symptoms were more severe ($b = 0.46$, $SE = 0.12$, $p < .001$). Thus, students with less responsive partners and also more severe symptoms reported greater health-compromising behaviors and illness-related stigma over time. No other lagged moderation effects were significant ($ps > .06$).

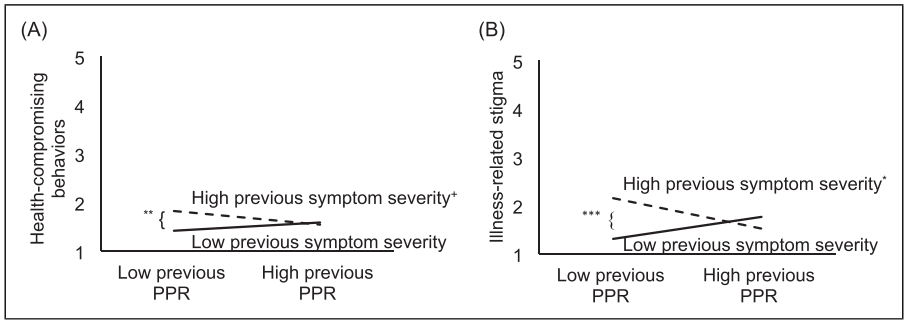

Figure 1. Visual depictions of post-hoc lagged interactions between previous illness symptom severity and previous perceived partner responsiveness (PPR) to disclosures on (A) health-compromising behaviors and (B) illness-related stigma. Greater PPR was associated with fewer health-compromising behaviors and lower illness-related stigma over time for those with more severe symptoms (dashed lines) but not less severe symptoms (solid lines). If PPR was low, students with more severe symptoms compared to less severe symptoms reported greater health-compromising behaviors and illness-related stigma over time. $^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

Discussion

We applied components of interpersonal disclosure process models to examine the concurrent and prospective health and social benefits of illness-related partner communication among students with CCHCs. In a longitudinal study spanning the academic year in which students returned to campus amid the COVID-19 pandemic, students with greater illness disclosures and perceived partner responsiveness also had better physical health, engaged in less health-compromising behaviors, felt less worried and stressed about the COVID-19 pandemic, and experienced lower stigma, discrimination, and social isolation. Over time, students' greater illness self-disclosures predicted lower health-compromising behavior engagement and illness-related discrimination. Likewise, perceived partner responsiveness to the disclosures predicted lower physical health problems and illness-related stigma over time. Notably, perceived partner responsiveness connected greater illness self-disclosures to better concurrent health, COVID-related, and social-contextual outcomes. These findings demonstrate the health and social benefits of talking openly about concealable illnesses with partners and, in turn, feeling cared for, validated, and understood. These findings identify underlying pathways connecting strong relationships to better health among those with heightened health risks.

This study fits within and extends both research and theory on interpersonal disclosure processes. Sharing personal thoughts and feelings with a partner and subsequently feeling cared for, validated, and understood are fundamental processes that help build and sustain romantic relationships (Laurenceau et al., 2004; Reis et al., 2017; Reis & Shaver, 1988). For those with concealable identities, these communication processes not only improve health and social-contextual outcomes, but they also facilitate continued disclosures that further enhance multiple domains across their lives (Chaudoir & Fisher, 2010). The

current study's findings extend this literature by demonstrating the importance of illness disclosures and partner responsiveness both concurrently and over time among those with concealable illnesses. These findings are important because stress communication and perceived partner responsiveness strongly predict better health, lower mortality rates, and lower stress (Farrell et al., 2023; Reis et al., 2017). Individuals with CCHCs already have elevated health risks because of their long-term diagnosis with daily symptoms and illness management (Bauer et al., 2014). The social threats from stigma and discrimination further harm their health and interfere with their relationships (Shrout & Weigel, 2021). Illness disclosures and partner responsiveness may help enhance long-term health and social relationships.

The longitudinal findings showed that although illness-related disclosures were unrelated to the outcomes concurrently, such disclosures predicted lower risky behavior engagement and illness-related discrimination over time. It may take longer for open and vulnerable disclosures to take effect and help deter health-compromising behaviors and ward off discrimination. Previous research has shown that talking openly about illness experiences promotes empowerment (Marino et al., 2016). Having the courage to talk about their CCHCs and share personal information with a trusted partner may, over time, generate feelings of safety and empowerment that ultimately reduce risky behaviors and discrimination experiences. In addition, perceived partner responsiveness to the disclosures predicted lower physical health problems and illness-related stigma both concurrently and over time. Interpersonal disclosure process models suggest that a confidant's reaction to the disclosure is one of the most important factors in predicting whether the disclosure is beneficial (Chaudoir & Fisher, 2010). Feeling understood, cared for, and validated after illness disclosures may help challenge the stigma associated with their CCHCs over time. These results illustrate the prospective protective effects of responsive partnerships on health and social outcomes; moreover, they underscore the importance of both drawing on and strengthening relationships to garner the support individuals with CCHCs need to offset the associated social and health risks, particularly during times of heightened stress.

Consistent with extensions and applications of interpersonal disclosure process models examining the illness context as a moderator in the disclosure process (Ferraris et al., 2023), the exploratory results identified CCHC symptom severity as an important context for health and well-being in the disclosure process. Students with more severe symptoms felt less stigmatized and engaged in marginally fewer health-compromising behaviors over time if their partners were more responsive to illness disclosures. In contrast, those with less responsive partners and also more severe symptoms reported greater health-compromising behaviors and illness-related stigma over time. These findings illustrate the importance of perceived partner responsiveness when CCHCs symptoms are severe to help reduce their behavioral and stigmatizing consequences.

Students' open-ended responses help substantiate and add depth to the quantitative findings. For some students, their social relationships struggled because they desired social connection but worried about the associated health risks. Students reported feeling misunderstood, excluded, and isolated because of their health condition. This finding is consistent with prior work demonstrating that students with CCHCs felt like they did not

fit in on campus (Shrout & Weigel, 2021, 2022) and shows that students felt socially isolated because of their CCHC—a growing epidemic with dire health consequences (U.S. Department of Health and Human Services, 2023). One positive trend was students reported receiving support from their romantic partners, providing solace, comfort, and connection during such challenging times. This positive relational trend aligns with the quantitative findings that, for those living with a CCHC during a global pandemic, perceived partner responsiveness matters for their health and social connection.

Students' open-ended responses also revealed exacerbated symptoms and delayed treatment as common experiences. They discussed having health-related setbacks, not seeking out care and hospitalization despite needing it, and that their symptoms were worse because of the pandemic. Though not a systemic analysis, these qualitative findings show the many hardships students with CCHCs faced during a global pandemic, particularly for their academic success, illness management, and close relationships. These experiences align with the close-ended survey questions showing that most students had moderate to severe symptom severity with somewhat to quite a bit of daily management. Most students were vaccinated against COVID, and about half had a prior COVID-19 diagnosis, yet most students reported moderate COVID-related stress and worry. However, students' COVID-related stress and illness discrimination changed across the academic year: both were highest at the beginning of the year when returning to campus and the middle of the year amid the Omicron spike, and then decreased by the end of the academic year when COVID rates declined, suggesting improvement in their stress and discrimination.

Although most students reported that their CCHCs often interfered with their academic performance, less than 10% received accommodations from the campus disability resource center across the academic year. To receive academic accommodations, students must disclose their CCHC to campus providers and faculty, yet students reported feeling uncomfortable doing so, with most students not disclosing their CCHCs to their professors. In the open-ended questions, students reported struggling academically because their CCHC interfered with coursework and class attendance, as well as feeling uncomfortable telling professors about their health condition. More than 4.29 million people have not graduated because of physical or psychological health issues (Megivern et al., 2003), and having a CCHC can lead to feelings of shame, guilt, and embarrassment (Quinn & Earnshaw, 2011). Needing to disclose stigmatized chronic conditions to faculty and staff may enhance feelings of shame and guilt and reduce their sense of belonging. It is important that campus and health care providers be mindful of these social challenges and establish practices that reduce rather than add to the stigma and discrimination individuals experience.

Strengths, limitations, and future directions

A strength of this study is the longitudinal design. Assessing students' experiences across the academic year returning to campus amid the COVID-19 pandemic allowed us to examine how their health, COVID-related, and social-contextual experiences changed over time. Importantly, the timing was unique: we captured their experiences returning to

campus, during the Omicron surge, and when mask mandates were lifted. These longitudinal assessments showed that students' COVID-related stress and illness discrimination were highest at the beginning or middle of the year and decreased by the end of the academic year. Likewise, by including several health, COVID-related, and social-contextual aspects, we demonstrated the beneficial effects of illness communication in relationships across multiple life domains. Integrating aspects from relational and concealable identity disclosure process frameworks allowed us to illustrate how illness communication in relationships offers multiple health and social advantages for those with otherwise easily hidable and often stigmatized illnesses. Recruiting students with CCHCs can also be difficult, especially during a turbulent pandemic. Obtaining these students' experiences across the pandemic provided important data on how their relationships promoted this challenging transition.

One limitation was that the current sample size was relatively small. However, the longitudinal design provided three measurements for participants. The results of the current data are also consistent with prior work on illness and stress communication (Laurenceau et al., 2004; Manne et al., 2004), further bolstering the reliability of the present findings. Self-report measures provided important insight into people's own perceptions of their relationships and lived experiences, yet including objective health measures like cortisol reactivity or heart rate variability would demonstrate how their relationship perceptions get under the skin to influence health. Likewise, we relied on one couple member's perceptions, but capturing dyadic interactions and behaviorally coding disclosures and responsiveness would provide objective data on relationship dynamics. Nevertheless, perceived partner responsiveness enhances health across self-report and biological health markers (Farrell et al., 2023; Shrout, Black et al., 2023). Examining how employees and middle-aged and older adults fared returning to work amid the pandemic is also worthwhile. University students may have less severe conditions or symptoms than those not attending university, posing additional health and social-contextual challenges.

Many individuals, including those without CCHCs, experienced changes in their health and social relationships across the COVID-19 pandemic (Chin et al., 2023; Huckins et al., 2020; Wang et al., 2022). Students' daily lives, and their social isolation in particular, were affected by campus COVID-related protocols. Though this study did not include both those with and without CCHCs, it is important to address differences in their health, COVID-related, and interpersonal outcomes, particularly as they navigate school and work settings with varying precautions. Likewise, it would be important to address how illness disclosures in other trusted relationships, such as close friendships, might ease transitions to work and school. Disclosing to a close friend while feeling cared for and validated in return may help reduce stigma and isolation and provide health benefits.

The illness-related disclosure measure did not include a specific time period, and descriptive results suggested that illness disclosures and the associated responsiveness did not change across the study. It is possible that individuals may have disclosed details about the CCHC prior to the study but not in between the waves. The means suggest that individuals were highly disclosing to partners and perceiving high levels of partner responsiveness across the study. Including time-sensitive measures and more thorough disclosure processes, such as the frequency and depth of disclosures, may provide a more

nuanced picture of illness disclosures in relationships. Given that illness-related self-disclosures predicted greater perceived partner responsiveness concurrently but not over time, a temporal association may have been shown if the responsiveness measure was specific to their health condition or their needs during the pandemic. The study recruitment and consent forms, along with instructions throughout the questionnaire, were specific to understanding how having a nonvisible, or concealable, health condition affects academics, health, and relationships while returning to campus amid the COVID-19 pandemic. However, the instructions for the illness disclosure measure, along with the health and social-contextual measures, did not specifically state the pandemic. It is possible that having a responsive partner to one's illness-related needs is beneficial to health and well-being, be it during the pandemic or not.

Conclusion

This longitudinal study identified illness communication—self-disclosures and perceived partner responsiveness to disclosures—as important predictors of health, COVID-related, and social-contextual outcomes among students with CCHCs in the year returning to campus amid the COVID-19 pandemic. Students who talked openly with their partners about their CCHCs and, in turn, felt cared for, validated, and understood had better physical health, engaged in less risky behaviors, felt less stressed and worried about the pandemic, and experienced less illness-related stigma, discrimination, and social isolation. These findings provide new evidence that perceived partner responsiveness is central to connecting illness disclosures to better health, COVID-related, and social outcomes among those with CCHCs. Living with a concealable health condition presents many social and health challenges. This research demonstrated the many advantages of illness communication in relationships.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Work on this project was supported by NIH grants KL2TR002530 and K12TR004415, National Center for Advancing Translational Sciences grants KL2TR002530 and K12TR004415.

Ethical statement

Ethical approval

All study procedures were approved and deemed exempt by the Purdue University Institutional Review Board, approval number IRB-2021-1442.

Open research statement

As part of IARR's encouragement of open research practices, the authors have provided the following information: This research was not pre-registered. The data and analytic code used in the research are available upon request from the first author at shrout@purdue.edu.

ORCID iDs

M. Rosie Shrout https://orcid.org/0000-0001-5751-1782
Emily M. Buehler https://orcid.org/0000-0003-1274-8131

Data availability statement

Analytic code and data are available upon request from the first author.

Note

1. To assess validity in the COVID-related outcome measures and how they distinguish from more general negative feelings, we examined their correlations with general stress and anxiety symptoms using the Depression, Anxiety, and Stress Scale (DASS-21; Henry & Crawford, 2005). COVID-related stress and worry were more strongly correlated with one another ($r = .63$) than with the stress and anxiety subscales (rs = .29 to .39); the stress and anxiety subscales were highly correlated with one another ($r = .69$). These correlations suggest that COVID-related outcomes were associated yet distinct from general stress and anxiety.

References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Sage Publications, Inc.

American College Health Association. (2019). *National college health assessment III: Reference group executive summary Fall 2019*. American College Health Association.

Bauer, U. E., Briss, P. A., Goodman, R. A., & Bowman, B. A. (2014). Prevention of chronic disease in the 21st century: Elimination of the leading preventable causes of premature death and disability in the USA. *Lancet (London, England)*, *384*(9937), 45–52. https://doi.org/10.1016/S0140-6736(14)60648-6

Blixen, C. E., Kanuch, S., Perzynski, A. T., Thomas, C., Dawson, N. V., & Sajatovic, M. (2016). Mental illness and diabetes. *American Journal of Health Behavior*, *40*(2), 12–19. https://doi.org/10.5993/AJHB.40.2.4

Braithwaite, S. R., Delevi, R., & Fincham, F. D. (2010). Romantic relationships and the physical and mental health of college students. *Personal Relationships*, *17*, 1–12. https://doi.org/10.1111/j.1475-6811.2010.01248.x

Brauer, M., & Curtin, J. J. (2018). Linear mixed-effects models and the analysis of nonindependent data: A unified framework to analyze categorical and continuous independent variables that vary within-subjects and/or within-items. *Psychological Methods*, *23*(3), 389–411. https://doi.org/10.1037/met0000159

Chaudoir, S. R., & Fisher, J. D. (2010). The disclosure processes model: Understanding disclosure decision making and postdisclosure outcomes among people living with a concealable

stigmatized identity. *Psychological Bulletin*, *136*(2), 236–256. https://doi.org/10.1037/a0018193

Checton, M. G., & Greene, K. (2012). Beyond initial disclosure: The role of prognosis and symptom uncertainty in patterns of disclosure in relationships. *Health Communication*, *27*(2), 145–157. https://doi.org/10.1080/10410236.2011.571755

Chin, B. N., Kamarck, T. W., Kraut, R. E., Zhao, S., Hong, J. I., & Ding, E. Y. (2023). Longitudinal associations of social support, everyday social interactions, and mental health during the COVID-19 pandemic. *Journal of Social and Personal Relationships*, *40*(5), 1579–1600. https://doi.org/10.1177/02654075221130786

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385–396. https://www.jstor.org/stable/2136404.

Earnshaw, V. A., Quinn, D. M., Kalichman, S. C., & Park, C. L. (2013). Development and psychometric evaluation of the chronic illness anticipated stigma scale. *Journal of Behavioral Medicine*, *36*(3), 270–282. https://doi.org/10.1007/s10865-012-9422-4

Farrell, A. K., Stimpel, A. L., Stanton, S. C. E., & Slatcher, R. B. (2023). Relationship quality and physical health: Responsiveness as an active ingredient predicting health across the lifespan. *Current Opinion in Psychology*, *52*, 101628. https://doi.org/10.1016/j.copsyc.2023.101628

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/bf03193146

Ferraris, G., Bei, E., Coumoundouros, C., Woodford, J., Saita, E., Sanderman, R., & Hagedoorn, M. (2023). The interpersonal process model of intimacy, burden and communal motivation to care in a multinational group of informal caregivers. *Journal of Social and Personal Relationships*, *40*(10), 3414–3436. https://doi.org/10.1177/02654075231174415

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the depression anxiety stress scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, *44*(Pt 2), 227–239. https://doi.org/10.1348/014466505X29657

Hopko, D. R., Stanley, M. A., Reas, D. L., Wetherell, J. L., Beck, J. G., Novy, D. M., & Averill, P. M. (2003). Assessing worry in older adults: Confirmatory factor analysis of the Penn State Worry questionnaire and psychometric properties of an abbreviated model. *Psychological Assessment*, *15*(2), 173–183. https://doi.org/10.1037/1040-3590.15.2.173

Huckins, J. F., daSilva, A. W., Wang, W., Hedlund, E., Rogers, C., Nepal, S. K., Wu, J., Obuchi, M., Murphy, E. I., Meyer, M. L., Wagner, D. D., Holtzheimer, P. E., & Campbell, A. T. (2020). Mental health and behavior of college students during the early phases of the COVID-19 pandemic: Longitudinal smartphone and ecological momentary assessment study. *Journal of Medical Internet Research*, *22*(6), Article e20185. https://doi.org/10.2196/20185

Jeon, Y.-H., Kraus, S. G., Jowsey, T., & Glasgow, N. J. (2010). The experience of living with chronic heart failure: A narrative review of qualitative studies. *BMC Health Services Research*, *10*, 77. https://doi.org/10.1186/1472-6963-10-77

Johnson, M. D., Anderson, J. R., Walker, A., Wilcox, A., Lewis, V. L., & Robbins, D. C. (2014). Spousal protective buffering and type 2 diabetes outcomes. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *33*(8), 841–844. https://doi.org/10.1037/hea0000054

Kowalsky, R. J., Farney, T. M., Kline, C. E., Hinojosa, J. N., & Creasy, S. A. (2023). The impact of the covid-19 pandemic on lifestyle behaviors in U.S. college students. *Journal of American College Health*, *71*(4), 1161–1166. https://doi.org/10.1080/07448481.2021.1923505

Laurenceau, J. P., Barrett, L. F., & Pietrornonaco, P. R. (2004). Intimacy as an interpersonal process: The importance of self-disclosure, partner disclosure, and perceived partner responsiveness in interpersonal exchanges. In *Close relationships: Key readings* (Vol. 74, pp. 241–257). https://doi.org/10.4324/9780203311851

Link, B. G., & Phelan, J. C. (2006). Stigma and its public health implications. *Lancet*, *367*(9509), 528–529. https://doi.org/10.1016/S0140-6736(06)68184-1

Livneh, H., & Antonak, R. F. (2005). Psychosocial adaptation to chronic illness and disability: A primer for counselors. *Journal of Counseling and Development*, *83*(1), 12–20. https://doi.org/10.1002/j.1556-6678.2005.tb00575.x

Manne, S. L., Norton, T. R., Ostroff, J. S., Winkel, G., Fox, K., & Grana, G. (2007). Protective buffering and psychological distress among couples coping with breast cancer: The moderating role of relationship satisfaction. *Journal of Family Psychology: JFP: journal of the Division of Family Psychology of the American Psychological Association (Division 43)*, *21*(3), 380–388. https://doi.org/10.1037/0893-3200.21.3.380

Manne, S. L., & Badr, H. (2008). Intimacy and relationship processes in couples' psychosocial adaptation to cancer. *Cancer*, *112*(11 Suppl), 2541–2555. https://doi.org/10.1002/cncr.23450

Manne, S. L., Ostroff, J., Rini, C., Fox, K., Goldstein, L., & Grana, G. (2004). The interpersonal process model of intimacy: The role of self-disclosure, partner disclosure, and partner responsiveness in interactions between breast cancer patients and their partners. *Journal of Family Psychology: JFP: journal of the Division of Family Psychology of the American Psychological Association (Division 43)*, *18*(4), 589–599. https://doi.org/10.1037/0893-3200.18.4.589

Manne, S. L., Siegel, S., Kashy, D., & Heckman, C. J. (2014). Cancer-specific relationship awareness, relationship communication, and intimacy among couples coping with early stage breast cancer. *Journal of Social and Personal Relationships*, *31*(3), 314–334. https://doi.org/10.1177/0265407513494950

Marino, C. K., Child, B., & Campbell Krasinski, V. (2016). Sharing Experience Learned Firsthand (SELF): Self-disclosure of lived experience in mental health services and supports. *Psychiatric Rehabilitation Journal*, *39*(2), 154–160. https://doi.org/10.1037/prj0000171

Megivern, D., Pellerito, S., & Mowbray, C. (2003). Barriers to higher education for individuals with psychiatric disabilities. *Psychiatric Rehabilitation Journal*, *26*(3), 217–231. https://doi.org/10.2975/26.2003.217.231

Mullins, A. J., Gamwell, K. L., Sharkey, C. M., Bakula, D. M., Tackett, A. P., Suorsa, K. I., Chaney, J. M., & Mullins, L. L. (2017). Illness uncertainty and illness intrusiveness as predictors of depressive and anxious symptomology in college students with chronic illnesses. *Journal of American College Health*, *65*(5), 352–360. https://doi.org/10.1080/07448481.2017.1312415

Pietromonaco, P. R., & Collins, N. L. (2017). Interpersonal mechanisms linking close relationships to health. *American Psychologist*, *72*(6), 531–542. https://doi.org/10.1037/amp0000129

Pilkonis, P. A., Yu, L., Dodds, N. E., Johnston, K. L., Lawrence, S. M., & Daley, D. C. (2016). Validation of the alcohol use item banks from the patient-reported outcomes measurement

information System (PROMIS). *Drug and Alcohol Dependence*, *161*, 316–322. https://doi.org/10.1016/j.drugalcdep.2016.02.014

Quinn, D. M., & Earnshaw, V. A. (2011). Understanding concealable stigmatized identities: The role of identity in psychological, physical, and behavioral outcomes. *Social Issues and Policy Review*, *5*(1), 160–190. https://doi.org/10.1111/j.1751-2409.2011.01029.x

Reis, H. T., Lemay, E. P., & Finkenauer, C. (2017). Toward understanding understanding: The importance of feeling understood in relationships. *Social and Personality Psychology Compass*, *11*(3), 1–22. https://doi.org/10.1111/spc3.12308

Reis, H. T., & Shaver, P. (1988). Intimacy as an interpersonal process. In *Handbook of personal relationships* (pp. 367–389). John Wiley & Sons.

Rockwood, N. J., & Hayes, A. F. (2017). MLmed: An SPSS macro for multilevel mediation and conditional process analysis. Poster Presented at the Annual Meeting of the Association of Psychological Science (APS), Boston, MA. https://www.afhayes.com

Schat, A. C. H., Kelloway, E. K., & Desmarais, S. (2005). The Physical Health Questionnaire (PHQ): Construct validation of a self-report scale of somatic symptoms. *Journal of Occupational Health Psychology*, *10*(4), 363–381. https://doi.org/10.1037/1076-8998.10.4.363

Scobie, H. M., Panaggio, M., Binder, A. M., Gallagher, M. E., Duck, W. M., Graff, P., & Silk, B. J. (2023). Correlations and Timeliness of COVID-19 Surveillance Data Sources and Indicators — United States, October 1, 2020–March 22, 2023. *MMWR. Morbidity and Mortality Weekly. Report*, *72*(19), 529–535. https://doi.org/10.15585/mmwr.mm7219e2

Shrout, M. R. (2021). The health consequences of stress in couples: A Review and new integrated dyadic biobehavioral stress model. *Brain, Behavior, & Immunity - Health*, *16*, 100328. https://doi.org/10.1016/j.bbih.2021.100328

Shrout, M. R., Black, A. E., Wilson, S. J., Renna, M. E., Madison, A. D., Kiecolt-Glaser, J. K., & Reis, H. T. (2023). How aging couples' emotional and physiological associations change across positive, supportive, and conflictual discussions: Roles of capitalization and responsive behaviors. *Biological Psychology*, *177*(108500), 108500. https://doi.org/10.1016/j.biopsycho.2023.108500

Shrout, M. R., & Weigel, D. J. (2018). Infidelity's aftermath: Appraisals, mental health, and health-compromising behaviors following a partner's infidelity. *Journal of Social and Personal Relationships*, *35*(8), 1067–1091. https://doi.org/10.1177/0265407517704091

Shrout, M. R., & Weigel, D. J. (2021). A two-wave study on the health and relationship consequences of experienced stigma among individuals with concealable chronic health conditions. *Journal of Health Psychology*, *26*(6), 860–869. https://doi.org/10.1177/1359105319849637

Shrout, M. R., & Weigel, D. J. (2022). The impact of concealable chronic health conditions on college students' academic outcomes: A two-wave study. *Journal of Health Psychology*, *27*(12), 2860–2872. https://doi.org/10.1177/13591053211068111

Shrout, M. R., Weigel, D. J., & Laurenceau, J.-P. (2024). Couples and concealable chronic illness: Investigating couples' communication, coping, and relational well-being over time. *Journal of Family Psychology: JFP: Journal of the Division of Family Psychology of the American Psychological Association (Division 43)*, *38*(1), 136–148. https://doi.org/10.1037/fam0001136

Silk, B. J., Scobie, H. M., Duck, W. M., Palmer, T., Ahmad, F. B., Binder, A. M., Cisewski, J. A., Kroop, S., Soetebier, K., Park, M., Kite-Powell, A., Cool, A., Connelly, E., Dietz, S., Kirby,

A. E., Hartnett, K., Johnston, J., Khan, D., Stokley, S., & Ritchey, M. D. (2023). COVID-19 Surveillance After Expiration of the Public Health Emergency Declaration — United States, May 11, 2023. *MMWR. Morbidity and Mortality Weekly. Report*, *72*(19), 523–528. https://doi.org/10.15585/mmwr.mm7219e1

Stuart, H., Milev, R., & Koller, M. (2005). The inventory of stigmatizing ExperiencesL its development and reliability. *World Psychiatry: Official Journal*, *4*(Suppl 1), 35–39.

Twenge, J. M., & Joiner, T. E. (2020). Mental distress among U.S. adults during the COVID-19 pandemic. *Journal of Clinical Psychology*, *76*(12), 2170–2182. https://doi.org/10.1002/JCLP.23064

U.S. Department of Health and Human Services. (2023). *Our epidemic of loneliness and isolation: The U.S. surgeon general's advisory on the healing effects of social connection and community.* U.S. Department of Health and Human Services. https://www.hhs.gov/sites/default/files/surgeon-general-social-connection-advisory.pdf

Wang, S., Quan, L., Chavarro, J. E., Slopen, N., Kubzansky, L. D., Koenen, K. C., Kang, J. H., Weisskopf, M. G., Branch-Elliman, W., & Roberts, A. L. (2022). Associations of depression, anxiety, worry, perceived stress, and loneliness prior to infection with risk of post–COVID-19 conditions. *JAMA Psychiatry*, *79*(11), 1081–1091. https://doi.org/10.1001/jamapsychiatry.2022.2640

Ward, B. W., Schiller, J. S., & Goodman, R. A. (2014). Multiple chronic conditions among us adults: A 2012 update. *Preventing Chronic Disease*, *11*(4), E62–E67. https://doi.org/10.5888/pcd11.130389