Meaning-Reconstruction Factors and Wellbeing in Cancer Survivor-Caregiver Dyads: Daily Associations and Mechanisms

Short title: Meaning Factors and Wellbeing

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This version of the article has been peer reviewed and accepted for publication at Health Psychology. This postprint (Author Accepted Manuscript) is NOT the Version of Record and does not include any post acceptance improvements and corrections. This research was funded in whole by National Science Centre, Poland, grant No. 2013/10/E/HS6/00189. For the purpose of Open Access, the author has applied a CC-BY public copyright license to any Author Accepted Manuscript (AAM) version arising from this submission.

Author Note

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This study was not preregistered. All analysis codes, outputs, and additional materials are available at OSF. The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions. The data contain potentially identifiable information, as they come from two related persons. The study was supported by the National Science Centre, Poland, grant No. 2013/10/E/HS6/00189 awarded to Aleksandra Kroemeke. We have no conflict of interest to

disclose. We would like to thank Zuzanna Kwissa-Gajewska, PhD, for her assistance throughout the study.

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Abstract

Objective: The study aimed to expand the existing research on the meaning-making processes in cancer by examining (*1*) the relationship between daily meaning making and meanings made versus the emotional and social wellbeing in survivor-caregiver dyads, (*2*) whether meanings made moderated or mediated the meaning-making–wellbeing associations at the within- and between-dyad level, and (*3*) whether meaning factors varied across or within persons. **Methods:** Two hundred dyads completed measures of meaning-making, meanings made, positive and negative affect, and loneliness for 28 consecutive post-hospitalization days following hematopoietic cell transplantation. Computations were based on the actor-partner interdependence model and its extensions, using multilevel structural equation modeling. **Results:** Positive emotional effects of meanings made and mixed effects of meaning-making were found. Meanings made mediated, but not moderated, the association between meaning making and affect. Meaning factors varied substantially between- but less so within-person. **Conclusions:** Further research on the meaning-making process and practical actions will require a greater focus on the level of the analysis, the role in the dyad, and interpersonal aspects.

Keywords: meaning making, wellbeing, dyadic study, daily study, cancer

Public Significance Statement

(1) Meaning making and meanings made varied substantially between dyads than days during the post-HCT outpatient period. (2) Meanings made had beneficial emotional effects in HCT recipient-caregiver dyads; the effects of meaning-making were mixed, but positive if mediated by meanings made. (3) The associations between meaning factors and wellbeing were interpersonal as well (i.e. HCT recipient-to-caregiver and vice versa).

Meaning-Reconstruction Factors and Wellbeing in Cancer Survivor-Caregiver Dyads: Daily Associations and Mechanisms

Cancer diagnosis and treatment are perceived as a series of highly stressful events by the survivors [i.e. individuals living with, through, and beyond a cancer diagnosis (Marzorati et al., 2017)] and their informal caregivers (i.e. family members or friends), and are associated with negative psychological consequences (Thompson et al., 2021). At various stages of cancer therapy, a number of physical, emotional and social burdens will befall both parties (Deckx et al., 2014; Gray et al., 2020; Kuba et al., 2019; Ochoa et al., 2020). Psycho-social consequences will affect the individuals who directly or indirectly experience the disease, but they may also be transmitted, i.e. survivors-to-caregivers and vice versa (Rajaei et al., 2021). In consequence, neoplastic disease may undermine basic beliefs, particularly existential (i.e. pertaining to order and meaningfulness), in both dyad members (Park & Hanna, 2022; Taylor, 1995). Therefore, the meaning-reconstruction process while dealing with cancer attracts the attention of researchers and clinicians. This study aimed to offer deeper understanding of the issue by examining the combined effects of meaning making and its product on the wellbeing of cancer survivor-caregiver dyads, allowing for variability and relationality of the meaning restoration process.

Meaning-Reconstruction Process in Cancer

According to the meaning-making model (Park & Hanna, 2022), the two main meaning-reconstruction factors include *meaning-making coping* (i.e. searching for meaning in cancer) and *meanings made* (i.e. the product of meaning-making coping). The process of meaning making is initiated by the apprised meaning of the disease and the resulting distress, i.e., perception of the discrepancies between the meaning of the current circumstances and the global meaning (i.e. values, goals, beliefs). Next, meaning-making coping is initiated, aiming to reduce distress by means of introducing changes into the perceived meaning of the disease

or global beliefs and life goals. Meanings made (i.e., perception of benefits, positive life changes or growth) is the result of a successfully resolved stress transaction, which then conditions the current wellbeing of an individual.

Although meaning making seems to be playing a crucial role in coping with cancer, the literature on the matter remains limited at best. Little attention has been paid to (*1*) variability of both meaning-reconstruction factors, (*2*) their combined role as predictors of wellbeing, including their underlying mechanisms, and (*3*) the interpersonal aspects of the meaning reconstruction process in cancer survivor-caregiver dyads.

Meaning Factors: Dispersion, Outcomes, and Relational Context

The available research—mostly qualitative—has demonstrated variability in meaning making and meanings made in cancer survivors and their caregivers (Gibbons et al., 2019; Gorawara-Bhat et al., 2019; Lee, 2008; van der Spek et al., 2013). A study of oral-digestive cancer survivors, one year post-diagnosis, found that approximately half of the study participants engaged in the process of meaning making, or claimed that the disease changed their view on life or its meaning (Moye et al., 2020). About one-fourth claimed that they never assigned meaning to their neoplastic disease; while the same number of patients found no meaning even despite having searched for it. In a longitudinal quantitative research among breast cancer survivors, heterogeneity in meaning making and meanings made was found at three and 11 months since diagnosis (Kernan & Lepore, 2009). Forty-four percent of the women searched for meaning at both time points, 28% never engaged in meaning making, whereas the rest reported higher meaning making either only at the more distant (15%) or nearer (13%) time point. A comparable distribution was observed for successful meanings made. To sum up, meaning making and meanings made are most probably non-universal reactions to cancer. To date, researchers have focused on the qualitative approach to the fluctuations in meaning factors or, in the best-case scenario, they focused on interindividual

differences. However, the findings of Kernan and Lepore suggest that variability may also be intraindividual. Still, the literature offers few studies which would test both, between-person differences and within-person fluctuations in that respect.

Various authors have suggested that both meaning-reconstruction factors are associated with emotional wellbeing in cancer survivors (Park & Hanna, 2022; Seiler & Jenewein, 2019). However, their research has produced inconclusive findings. Some longitudinal studies demonstrated positive correlates of meaning making (Boehmer et al., 2007; Park et al., 2008). In others, meaning making was associated with higher distress and deteriorated mental functioning (Gan et al., 2018; Kernan & Lepore, 2009; Roberts et al., 2006). Similar data have been reported for meanings made, demonstrating positive, negative or no correlates with adjustment in cancer survivors (Ochoa Arnedo et al., 2019; Tomich & Helgeson, 2012). Studies on the adaptive correlates of meaning-reconstruction factors in the caregivers are even less numerous, but they demonstrate a similar trend: unfavorable effects of meaning making (Manne et al., 2009) and mixed effects of meanings made (Kim et al., 2007). Data ambiguity may be the result of a relatively limited number of studies which would take into account both meaning factors at the same time. Possibly, adaptability of meaning making depends on whether the meaning has been found or restored (Park & Hanna, 2022). Longitudinal studies have laid the foundation for the hypothesis assumed by the meaning-making model that meanings made mediates the relationship between meaning making and psychological wellbeing in cancer survivors, two years after treatment (Park et al., 2008) or since diagnosis (Gan et al., 2018). Another study points to the moderating role of meanings made in this process: Meaning making was associated with higher cancer-related distress five years after diagnosis in the caregivers, who reported only lower levels of meanings made (Manne et al., 2009). In contrast, in breast cancer survivors, meanings made did not moderate the longitudinal links of meaning making with negative affect (Kernan & Lepore, 2009). In light

of the above, research on the mechanisms of intercorrelation between meaning making and meanings made seems necessary.

Until recently, little attention has been devoted to non-emotional correlates of meaning factors. To the best of our knowledge, only two studies so far have focused on social wellbeing. In survivors with malignant tumors, meaning-making coping positively prospectively predicted the social domain of health-related quality of life (Boehmer et al., 2007). In a study of breast cancer survivors, benefit finding (i.e. indicator of meanings made) was cross-sectionally and prospectively curvilinearly related with cancer-related social disruption (Lechner et al., 2006). Large cross-sectional population studies indicated that meaning in life (next to health status) is the most vital predictor of loneliness, an indicator of social wellbeing (Macià et al., 2021). Loneliness in cancer survivors and their caregivers correlates with deteriorated physical and emotional wellbeing (Gray et al., 2020; Jaremka et al., 2014; Segrin et al., 2019). In the general population, it is even associated with increased morbidity and mortality (Holt-Lunstad et al., 2015; Leigh-Hunt et al., 2017).

The social context of the meaning making process remains to be fully elucidated. According to social constructivism, meaning-reconstruction is a shared experience, built through social interactions and the use of narrative structures (Collie & Long, 2005). A similar conceptualization originates from dyadic coping models, in which stress and coping are viewed interpersonally (Kayser et al., 2007). Samios and Baran (2018) reviewed theories supporting the interpersonal character of meaning making in a dyad and pointed to the interactions between meaning making, meanings made and wellbeing. Still, studies which explicitly test those associations in cancer survivor-caregiver dyads are scarce. A dyadic-study in breast cancer-partner spouses found that survivor growth was not an individual activity; it depended on lower partner-reported meaning making and positive reappraisal, and their greater emotional expression (Manne et al., 2004). In their study of couples who

experienced a stressful life event, Samios and Baran (2018) discovered that the associations between meaning making and meanings made were only intrapersonal, whereas the associations between meanings made and adjustment were interpersonal. Moreover, meanings made mediated the relation between meaning making and adjustment of an individual and their partner (actor-actor and actor-partner indirect effect, respectively).

Present Research

This study has examined the effects of meaning making and meanings made on emotional (positive and negative affect; PA and NA) and social wellbeing (loneliness) in cancer survivor-caregiver dyads during the first month after hematopoietic cell transplantation (HCT). Compared to the most often investigated populations of cancer survivors, this study group is unique due to the equal distribution of sex and procedure specificity. HCT is one of the most aggressive forms of treatment for hematological neoplasms (Copelan, 2006), associated with adverse effects, strict medical regimen, and life-threatening therapy. Therefore, HCT survivors and their caregivers may experience feelings of isolation, lack of control, or fear of death and cancer progression in the post-HCT period. Research indicates that its affects the wellbeing of both parties (Janicsák et al., 2021), and can trigger an existential crisis (Dunn et al., 2016; Gemmill et al., 2011) and search for meaning (Adelstein et al., 2014). In order to expand the existing research, we investigated between- (average) and within-dyad (acute) effects of the meaning factors and their mechanisms in the dyads. Given the previous findings (Boehmer et al., 2007; Ochoa Arnedo et al., 2019; Park et al., 2008; Tomich & Helgeson, 2012), we expected that greater meaning making and meanings made in general will be associated with higher PA (Hypothesis 1, *H1*) and lower NA (*H2*) and loneliness (*H3*) across days in the survivors and caregivers (Figure 1, Panel A). We also hypothesized that fluctuation in daily meaning making and meanings made *in plus* will be associated with fluctuation in wellbeing i.e. higher next-day PA (*H4*), lower next-day NA

(*H5*) and loneliness (*H6*) in both parties. To the best of our knowledge, this has been the first direct empirical test of wellbeing correlates of meaning structures which took into account simultaneous action of both meaning factors, as well as their intraindividual fluctuations and interpersonal character. Although the evidence for cross-partner associations is sparse, we tentatively hypothesized beneficial partner effects of the meaning factors. In a more exploratory fashion, we also tested for the existence of fluctuation in the reported meaning structures and location of the sources of day-to-day variations (between days or dyads; Question 1, *Q1*). As meanings made might condition the effectiveness of meaning making (Manne et al., 2009) or mediate this process (Gan et al., 2018; Park et al., 2008; Samios & Baran, 2018), we also explored whether meanings made moderated (*Q2*; Figure 1, Panel B) or mediated the associations between daily meaning making and wellbeing (*Q3*; Figure 1, Panel C) in both parties. Due to the exploratory nature and assumptions about the interpersonal nature of meaning reconstruction in the post-HCT period, we tested all possible moderating (actor by actor/partner, partner by actor/partner in HCT survivors and caregivers) and mediating (actor-actor, actor-partner, partner-actor, and partner-partner in both parties) effects.

Figure 1 about here

Method

Transparency and Openness

In this article, we report how we determined our sample size, all data exclusions, all manipulations, and all measures that were included in the study. All analysis codes, outputs, and additional materials are available at OSF. The dataset for this study is not available due to privacy and ethical restrictions. The data contain potentially identifiable information, as they come from two related persons. Data were analyzed using Mplus version 8.8 (Muthén & Muthén, 1998). This study was not preregistered.

Participants

The sample consisted of 200 eligible cancer survivors (57% men, M_{age} = 47.85±13.48) and their caregivers (70.5% women, M_{age} = 47.38±13.11). The sample size was estimated based on simulation studies using the Monte Carlo approach (Bolger & Laurenceau, 2013). The inclusion criteria for the cancer survivors were: first autologous or allogeneic HCT, age >18 yrs, and no other major disabling medical or psychiatric conditions. The eligibility criteria for the caregivers included close contact and taking care of the survivors during the outpatient period, age >18 yrs, and no major disabling medical or psychiatric conditions. The dyads were recruited at the Department of Bone Marrow Transplantation and Oncohematology of Maria Skłodowska-Curie National Research Institute of Oncology, Gliwice Branch, Poland. Out of the initial group of eligible cancer survivors (*N* = 561), 285 individuals consented to participate in the study, of which 33 caregivers refused consent. Of 252 dyads, six patients were ultimately not eligible for HCT, 17 died during hospitalization, three dyads withdrew their consent, 17 did not return the daily-diaries, and nine dyads completed fewer than five diary-days (dyad flowchart is presented in Figure S1 at OSF). Attrition analysis revealed that autologous HCT was associated with a higher likelihood of study completion as compared to allogeneic HCT ($p < .001$).

Patients who had undergone autologous HCT (74%) and survivors with lymphomas constituted the dominant group (48%), followed by multiple myeloma (31%), leukemias and other myeloid neoplasms (17.5%), and other cancer types (3.5%). Mean time since diagnosis was 21.89±24.07 months, while isolation length was 18.51±9.32 days (14.45±3.52 for autologous and 30.08±10.91 for allogeneic HCT recipients). The survivors and the caregivers had at least secondary education (*M* =14.18±3.32 and *M* =14.07±3.29 yrs of education, respectively). The employment rate for the survivors and the caregivers was 37% and 61.5%,

respectively. Most of the dyads (77.5%) were married or cohabiting (parent-child 11%; child-parent 8%; siblings 3%; other 0.5%). Mean duration of the relationship was 25.34±12.26 yrs.

Procedure

Local Ethics Committee approved of the study (No. 24/2014). Written informed consent was obtained. The survivors completed the initial questionnaires (clinical data were obtained from their medical records) and appointed a caregiver who consented to participate during an individual meeting. Daily diaries were collected on post-hospitalization day 1, paper (87.5%) or web-based (12.5%), and completed for 28 consecutive days. The participants were instructed to complete the diary every evening (one entry took 6–8 min), independently, and not to report retrospectively, if an entry was missed. All participants received a reminder via a short text message to complete the diary every evening. They were contacted three times during the study period to address any issues.

Measures

Daily meaning-making coping and meanings made. Survivor and caregiver meaning making and meanings made were measured using single-item statements ("Today, I was searching for the meaning and purpose of my disease/of his/her disease" and "Today, I found the meaning and purpose of my disease/of his/her disease"), as in previous studies (Kernan & Lepore, 2009; Manne et al., 2009). The statements were assessed on a 4-point scale (1–*I haven't been doing this at all;* 4–*I've been doing this a lot*). Higher reported scores indicated higher daily meaning factors.

Daily psychological and social wellbeing. Daily PA and NA were measured using six positive (happy, enthusiastic, content, pleased, excited, relaxed) and six negative (unhappy, irritable, bored, sad, nervous, sluggish) adjectives based on the circumplex model of emotion (Larsen & Diener, 1992). The adjectives were assessed on a 7-point scale (1–*not at all;* 7–*very strongly*). Higher reported scores indicated higher daily PA and NA. Within-dyad

reliabilities (omega coefficients, ω) were .89 for each affect per parties, while between-dyad reliabilities ranged from .90 to .94. Daily loneliness was measured using four items from the UCLA Loneliness Scale ver. 3 (Russell, 1996), adapted to daily approach. The statements (e.g., "Today, I felt alone", "Today, I felt close to people") were assessed on a 5-point scale (1–*not at all; 5–very strongly*). Higher reported scores indicated greater daily loneliness. Within-dyad reliabilities (ω) were .79 for both parties, while between-dyad reliabilities were .68 for the survivors and .70 for the caregivers.

Analytic Strategy

The analyses focused on daily emotional and social wellbeing as a function of meaning factors in HCT recipient-caregiver dyads. The models were estimated using multilevel structural equation modeling (MSEM) (Laurenceau & Bolger, 2013). The associations were estimated at two levels with random slopes, separately for each wellbeing indicator. In each model, the linear time trend (centered on the middle time point) and previous-day wellbeing were controlled, allowing to predict change in wellbeing. The predictors were divided into within- (deviation from the person mean) and between-dyad (stable mean for each person across all diary-days) products, and data were checked for missingness. The missing data were <11% (from 6.8% for survivor-reported meaning making to 10% for caregiver-reported PA) and were slightly higher for the caregivers (9.1–10%) as compared to the survivors (6.8–8%). No significant associations were found between the missing data and the intercepts and slopes of the analyzed variables in the dyad members. Missing data were handled within the MSEM using the full information maximum likelihood approach (Enders & Bandalos, 2001). A maximum likelihood estimator was used.

Between- and within-dyad associations. *H1-6* were analyzed based on the actor-partner interdependence model; APIM (Kenny et al., 2006). Fixed and random effects were estimated for pairs of intercepts, actor effects (i.e., the effects of meaning making and

meanings made within a dyad member), and partner effects (i.e. the effects of meaning factors across dyad members) for both partners (Figure 1, Panel A). Further, sensitivity analysis was conducted to assess whether the results would change under different controls (gender, age, education, transplant type, time since diagnosis, and relationship duration). As the results remained essentially unchanged after controlling for the confounders, the findings are presented without controls. For *Q1*, the intercept only model was computed to obtain the intraclass correlation coefficients (ICCs), which represents the percent of variance located at the between-dyad level.

Moderation effects. *Q2* was tested based on the actor-partner interdependence moderation model; APIMoM (Garcia et al., 2015). Fixed and random effects for pairs of intercepts, actor effects, partner effects, and eight moderation effects for both partners were estimated (Figure 1, Panel B). The moderation was created as an interaction product between centered daily meaning making and meanings made; interactions for the actor and partner effects with actor and partner moderator were investigated.

Indirect effects. For *Q3*, a two-level mediation model was applied (Preacher et al., 2010) as an extension of the APIM model; APIMeM (Figure 1, Panel C) (Ledermann et al., 2011). The indirect effect at the within-dyad level is *a* (predictor-to-mediator) × *b* (mediator-to-outcome) random effects + covariance between random *a* and *b* paths, while at the between-dyad level it is $a \times b$. As the random effects for *a* and *b* in our sample were too low to warrant calculation, the indirect effect was the product of the *a* and *b* paths (Badr et al., 2010). Furthermore, due to the problem with model convergence, covariances between random effects were excluded (they were statistically insignificant in the preliminary analyses). For loneliness, models with fixed slopes were calculated due to problems with model convergence.

Results

Descriptive Statistics and Sources of Variation

The total number of fully completed diaries was 4032 (72%; mean = 26.21 days) and 3360 (60%; mean = 25.68 days) for the survivors and the caregivers, respectively. Means, standard deviations, ICCs, and bivariate correlations of the respondent-reported variables across 28 days are presented in Table S1 in the online supplement at OSF. Frequency distributions of participant-reported levels of variables are presented in Figure S2 in the online supplement. On average, the participants reported lower levels of both meaning factors and NA, as well as lower-to-moderate levels of PA and loneliness.

For meaning making and meanings made, the ICCs were .63 and .69, respectively for the survivors and .66 and .71, respectively for the caregivers. Most of the variance was explained by between-person differences; the remaining 37% and 31%, and 34% and 29% were explained by within-person fluctuations.

Between-dyad Associations between Meaning Processes and Wellbeing

The results of APIMs are presented in Table S2 in the online supplement at OSF. The between-dyad results indicated that survivors with higher average levels of meanings made also reported lower NA (B = -.73, p = .015) and greater PA across days (B = 1.73, p = .005), which supported *H1* and *H2*. Also, survivors with higher average levels of meaning making reported higher NA across days (B = 2.01, $p < .001$) and had caregivers with lower PA (B = -1.58, p = .006), which was in contrast to the assumptions. Loneliness was not linked to the meaning factors; *H3* was not confirmed. Other actor and partner effects were not statistically significant.

Within-dyad Associations between Daily Meaning Processes and Wellbeing

As for within-dyad associations, only three effects were statistically significant. In the caregivers, higher than usual meaning making was associated with higher next-day PA (B = .28, p = .006). In the survivors, higher than usual meanings made was linked with lower next-

day NA (B = -.27, p = .034). Also, higher than usual meanings made in the caregivers was associated with lower next-day NA in the survivors (B = -.20, p = .049). The effects were in line with *H4* and *H5*; *H6* has not been confirmed. Only two random slopes varied significantly across the participants: meaning making to PA in the survivors (B = .51, p = .046) and meanings made to NA in the caregivers (B = .64, p = .036).

Between- and Within-dyad Moderating Effect of Meanings Made

The results of multilevel moderation models are presented in Table S3 in the online supplement at OSF. Data indicate a lack of statistically significant interaction of meaning making × meanings made for each wellbeing indicator and level of the analysis. None of the random effects of the interactions varied significantly across dyads.

Between- and Within-dyad Mediating Effect of Meanings Made

The results of multilevel mediation models in HCT recipient-caregiver dyads are presented in Table S4 in the online supplement at OSF.

Between-dyad mediation. The between-dyad results indicated significant actor *a* paths (average meaning making to meanings made) in both, the survivors (NA model: B = .67, p < .001; PA model: B = .66, p < .001; Loneliness model: B = .70, p < .001) and the caregivers (NA and PA models: B = .82, p < .001; Loneliness model: B = .78, p < .001). Actor *b* path (average meanings made to wellbeing) was statistically significant for survivor PA (B = 2.02, p < .001) and borderline significant for their NA (B = -.74, p = .055). In the survivors, the association between meaning making and PA was indirect (B = 1.34, p < .001; direct effect: B = -.89, p = .117). For NA, it was direct (B = 1.98, p < .001), although the indirect effect was borderline significant (B = -.49, p = .057). In addition, a significant direct effect was found between survivor meaning making and caregiver PA (B = -1.15, p = .005). The remaining between-dyad paths were not statistically significant.

Within-dyad mediation. Within-dyad results revealed associations between fluctuations in meaning making and next-day meanings made (*a* path; NA model: $B = .05$, $p = .010$; PA model $B = .05$, $p = .005$; Loneliness model: $B = .04$, $p = .018$), and meanings made and wellbeing in the caregivers (*b* path; NA model: $B = -.25$, $p = .007$; PA model: $B = .28$, $p = .008$; Loneliness model: $B = -.14$, $p = .027$). However, actor-actor indirect effects between variables were not statistically significant in the caregivers (NA model: $B = .00$, $p = .944$; PA model: $B = .01$, $p = .170$; Loneliness model: $B = .00$, $p = .975$; direct effects: $B = .00$, $p = .898$; $B = .19$, $p = .063$; $B = .00$, $p = .976$, respectively). Statistically significant partner-actor indirect effect between fluctuation in survivor meaning making and caregiver next-day NA through fluctuation in caregiver next-day meanings made emerged ($B = -.01$, $p = .040$; direct effect: $B = -.02$, $p = .869$), despite a lack of statistically significant partner *a* path ($B = .02$, $p = .599$). A similar association, although borderline, was found for next-day PA (indirect effect: $B = .01$, $p = .054$; partner *a* path: $B = .02$, $p = .132$; direct effect: $B = -.07$, $p = .534$). Besides, statistically significant direct effect was found between daily fluctuation in meaning making and next-day PA in the survivors ($B = .23$, $p = .048$), and partner *a* path between caregiver fluctuation in meaning making and survivor fluctuation in next-day meanings made in PA model ($B = .02$, $p = .014$). The remaining within-dyad paths were not statistically significant. Figure 2 summarizes the study results.

Figure 2 about here

Discussion and Conclusions

In this study, we aimed to include the social context and intraindividual variation into the existing research on meaning factors by testing how daily meaning making and meanings made relate to subsequent emotional and social wellbeing (positive affect, negative affect, and loneliness) in cancer survivor-caregiver dyads. We investigated this process within a sample affected by HCT, taking into account the well-known challenges related to this treatment.

Additionally, we examined meanings made as a moderator and a mediator for meaning making–wellbeing associations at the within- and between-dyad level. The obtained results provide a more nuanced insight into how meaning factors fluctuate within dyads post-HCT.

The findings of this study support earlier reports of interindividual variability in meaning making and meanings made (Gibbons et al., 2019; Gorawara-Bhat et al., 2019; Kernan & Lepore, 2009; Lee, 2008; Moye et al., 2020; van der Spek et al., 2013). The between-person variance in meaning factors was higher than the within-person variance in our study, suggesting a substantial between-person difference in meaning, especially meanings made. Possibly, searching for meaning and having 'made sense' after HCT are long processes, with day-to-day fluctuations constituting a rare occurrence. Another likely explanation is that the participants were not at the stage of meaning making at the time of the study (which would explain the low scores for those variables) or had completed that process earlier. So far, there has been no consensus among the authors regarding the timeframe of the meaning-making process, which might take place either shortly after the event (Silver & Updegraff, 2013) or later on (Park & Hanna, 2022), if at all.

The pattern of interrelationships between meaning-reconstruction factors and wellbeing was irregular for the meaning-making coping and its product, the level of analysis, and for both parties, but in general it was consistent with earlier reports and partially consistent with our hypotheses. The effect of meaning making (controlled for meanings made) was mixed: caregivers—positive at the within-dyad level, survivors—negative at the between-dyad level and transmitted to the caregivers. While daily deviation over average level meaning making increased next-day PA (in the caregivers), aggregated higher average level meaning making (in the survivors) was associated with higher mean NA (in the survivors) and lower PA (in the caregivers). That finding expands the existing research, which had not differentiated between within-person fluctuations and between-person differences (Boehmer et al., 2007; Kernan &

Lepore, 2009; Manne et al., 2009; Park et al., 2008). To use the meaning-making model for explanation (Park & Hanna, 2022), the acute effect might have been mediated by successful meanings made. However, our further analysis did not support that hypothesis. Additional research on the mechanism connecting daily fluctuations in meaning making and affect valences is necessary. Earlier research supports detrimental mean emotional correlates of meaning making, which is indicative of the high costs of such a coping strategy (Gan et al., 2018; Kernan & Lepore, 2009; Roberts et al., 2006). While attempting to explain that finding, it seems prudent to take into consideration the correlative nature of these associations. Higher NA in the survivors may reflect their distress, which is supposed to activate the meaning-making process. Concomitant low PA in the caregiver may be indicative of mood contagion within the dyad (Neumann & Strack, 2000).

Across both levels of analysis, meanings made was positive, controlling for meaning making, which corresponds with the meaning-making theory (Park & Hanna, 2022) and some findings of the earlier research (Ochoa Arnedo et al., 2019; Tomich & Helgeson, 2012). Interestingly, meanings made predicted emotional wellbeing only in the survivors. Daily fluctuations above the mean level of survivor- and caregiver-reported meanings made decreased next-day survivor-reported NA. On average, higher meanings made was associated with higher PA and lower NA in the survivors. Taking into account the direct potentially life-threatening nature of the disease and HCT, it seems probable that the dynamics of the meaning-making process differs between the survivors and the caregivers, which would explain the different pattern of the correlation between affect and having 'made sense' after HCT, which needs to be further investigated.

The hypothesis that meaning making is beneficial only in those individuals with meanings made (Park & Hanna, 2022) has not been confirmed. A similar result was reported in breast cancer survivors one year post-diagnosis (Kernan & Lepore, 2009). Given that such

hypothesis was confirmed in the caregivers in a long-term survivorship (Manne et al., 2009), it seems safe to presume that such an association occurs when remission and stable meanings made were achieved. Mean, relatively low, levels of meanings made in our study sample indicate that either our study participants did not engage in meaning reconstruction, or were already in the process, or had completed the process earlier.

The results of indirect effect models revealed associations consistent with the meaning-making model (Park & Hanna, 2022), and earlier assumptions (Gan et al., 2018; Park et al., 2008). This study confirmed some indirect paths between meaning making and wellbeing via meanings made within dyads. On average, survivor meaning making was not directly related to their PA. That association was indirect and positive, indicating that higher meaning making was associated with higher meanings made, which in turn was related to higher PA. The indirect association between survivor meaning making and their NA was only borderline significant (and negative) but contrasted with a positive significant direct effect. Partner-actor indirect effect was found in the caregivers: Fluctuation in survivor meaning making attracted a change in the caregiver meanings made on the next day, which in turn was related to caregiver affect on that day. That suggests that testing of simple associations between meaning making and affect, even controlling for meanings made, may be biased and may fail to represent the nature of the relationship between these variables. Meanings made seems to be an essential link connecting meaning making with positive wellbeing.

Contrary to expectations, the meaning factors systematically did not predict social wellbeing, although in a lower-level mediation a statistically significant negative relationship was identified between daily meanings made and loneliness in the caregivers. A syntonous fluctuation was observed for the variables, which signals the need for further research into those relationships, including their inverse links. Loneliness, as an effect of lack of meaningful relationships (Macià et al., 2021), can stimulate or hinder the reconstruction of

meanings. Thus, lack of systematic links between these variables in this study may have resulted from the assumed direction of influences (i.e. meaning factors to loneliness) and factor extent (wide for meaning reconstruction as related to violation of general, existential beliefs, and narrow for loneliness as limited to the aspects of relationships).

Regarding the social context, the findings of our study expand the earlier reports by investigating the interpersonal processes within dyads. The obtained data highlighted different patterns of the tested associations across partners. What is more, the results reveal both, survivor and caregiver-driven coregulation (i.e., a process between the partners, initiated by the survivor or the caregiver). As far as the meaning–wellbeing association is concerned, the abovementioned mood contagion and the mediating effect of partner affect in those associations might offer a probable explanation of the obtained results. The associations between meaning making and next-day meanings made from mediating models are especially noteworthy. Transmission of the meaning making effect onto the partner may either be the consequence of shared meaning making within the process of narration or creating conditions that would be conducive to meaning making for the partner, as postulated by social constructivism (Collie & Long, 2005) or dyadic coping models (Kayser et al., 2007). Further research is necessary to investigate the nature of that transmission.

Practical Implications and Limitations

The results of our study might encourage other researchers who target the meaning-making process in the context of cancer to design intervention studies aimed at promoting the optimal emotions of survivors and caregivers by influencing meaning making and successful meanings made. Secondly, due to the processes of transmission and coregulation which occur in close dyads, studies of interventions which support meaning making should include both, the survivors and their informal caregivers.

Our study was not without limitations, which need to be addressed. Although we ventured to simultaneously investigate both meaning factors and the underlying mechanisms, not all components of the meaning making model had been included, which prevents us from making generalized conclusions about the process. Furthermore, despite intensively longitudinal measurements and the opportunity to identify the fluctuations of the variables, our study was limited to the period of time shortly after HCT. Thus, further research might focus on long-term intraindividual change using measurement burst design i.e., investigating intrapersonal processes at different time intervals since cancer diagnosis. As the study used the daily-diary approach, the measurement of meaning making and meanings made amounted to a single item, which was a significant simplification. However, an identical methodology has been used before (Kernan & Lepore, 2009; Manne et al., 2009). Additionally, the measurements were self-reported, which assumes an awareness of searching for meaning or having ‘made sense’. Finally, the sample can be considered as representative of the population of HCT survivors and their caregivers. However, generalizations about other contexts of cancer treatment or specific survivor-caregiver relationships based on our findings should be avoided.

Conclusions

We examined the associations between meaning making, meanings made, and emotional and social wellbeing at the between- and within-dyad level, and found substantial between-person difference in the meaning factors. We obtained consistent evidence for positive emotional effects of meanings made in HCT recipient-caregiver dyads. The effects of meaning making were mixed, but positive if mediated by meanings made. The associations were interpersonal as well and, in part, they were related with loneliness, which bridged the gap in research about the process of meaning making.

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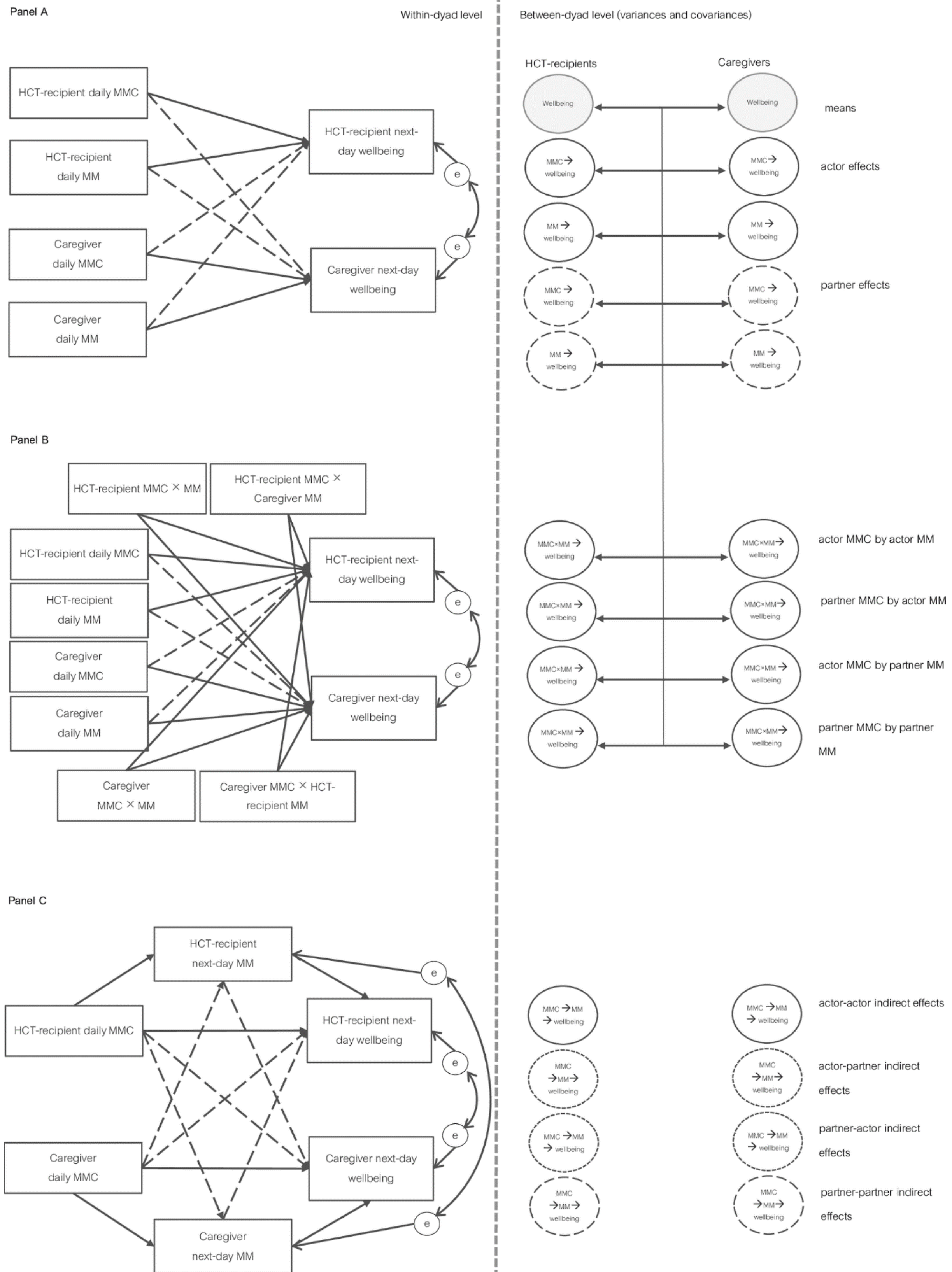
Figure 1

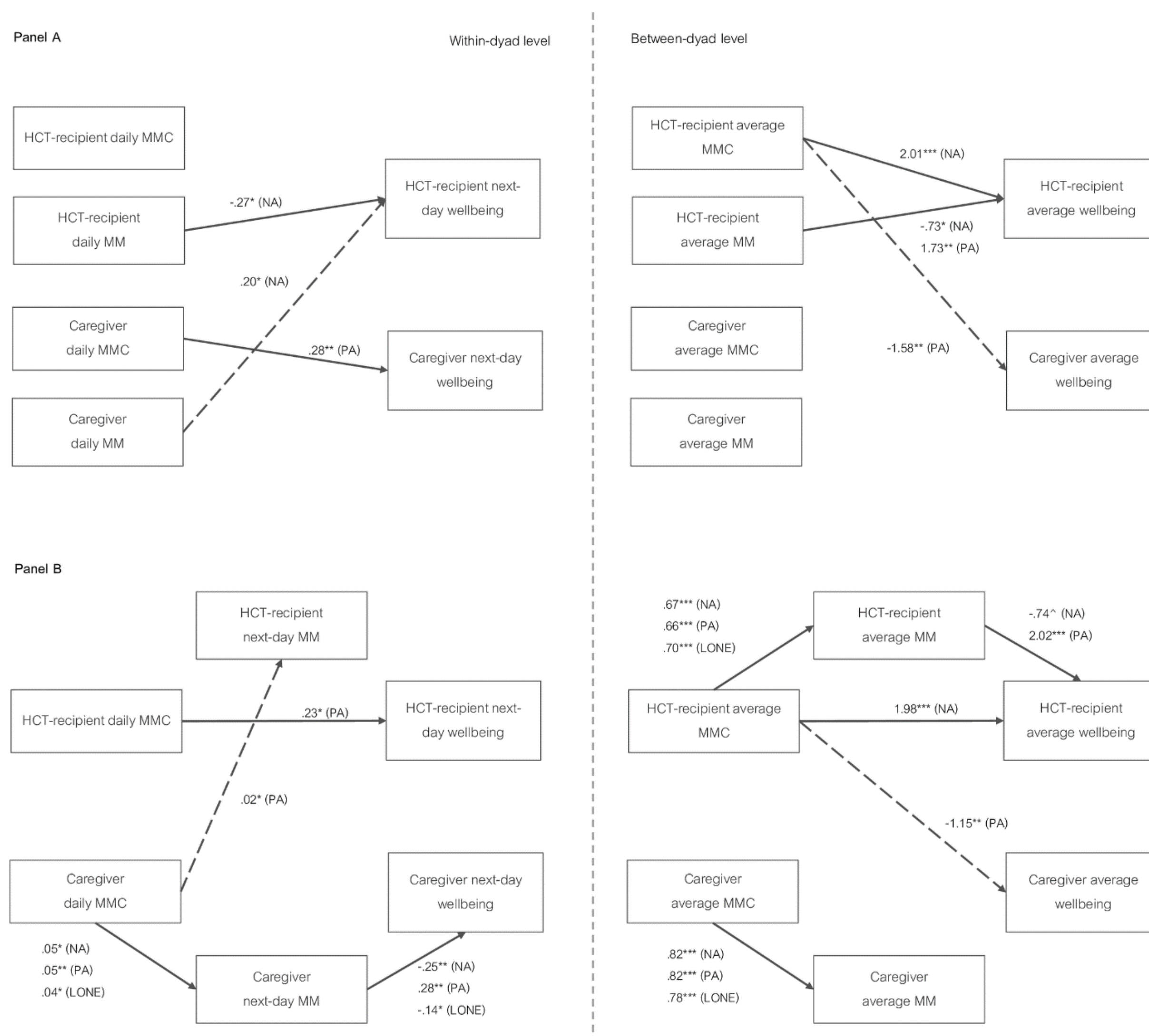
Research models



Note. Panel A: Average and acute effects of meaning making (MMC) and meanings made (MM) on dyad wellbeing (APIM). Panel B: Moderation effect of meanings made on the relationship between meaning making and wellbeing in dyads (APIMoM). Panel C: Mediation effect of meanings made in the relationship between meaning making and wellbeing in dyads (APIMeM). Covariates included in models: linear time trend, previous-day wellbeing (Panel A-C), and previous-day MM (Panel C).

Figure 2

Summary of the results of APIM (Panel A) and APIMeM (Panel B)



Note. MMC, MM, NA, PA, LONE i.e., meaning-making coping, meanings made, negative affect, positive affect, and loneliness model, respectively. Statistically significant indirect effects in Panel B: HCT-recipient MMC→MM→PA (p < .001; between-dyad level); HCT-recipient MMC→caregiver next-day MM→caregiver same-day NA (p = .040; within-dyad level). Models adjusted for time, previous-day wellbeing, and previous-day MM (Panel B only). Unstandardized coefficients are provided. ^p = .055, *p < .05, **p < .001, ***p < .001.