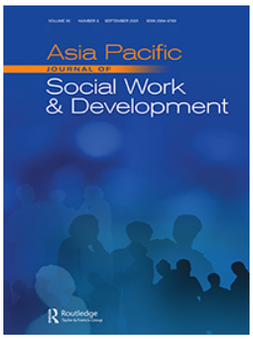

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Social media engagement and family caregivers' perceived positive aspects of caregiving: an inverted U-shape relationship

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ABSTRACT

Although the mixed findings regarding social media's impacts on family caregivers' well-being imply a non-linear association, scant studies understand this phenomenon from a non-linear perspective. Moreover, limited research understands social media engagement's effects on family caregivers' perceived positive aspects of caregiving (PAC), an essential indicator of their well-being. These research scarcities prevent us from helping family caregivers achieve the optimal effect of social media for enhancing their well-being. To bridge the research gaps, this research investigates explicitly the association between family caregivers' social media engagement and their perceived PAC. With survey data from family caregivers ($N = 125$), regression analysis results confirm an inverted U-shape relationship between their social media engagement and their perceived PAC. This research enriches existing literature by challenging the traditional belief of solely positive or negative linear effects of social media engagement, offering a possible explanation for the inconsistent results about social media engagement and family caregivers' well-being.

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KEYWORDS
Social media engagement; family caregiver; positive aspects of caregiver; Non-linear relationship; well-being

Introduction

Providing care for family members and others in need is increasingly difficult and challenging during and even after the COVID-19 pandemic (Kukreti et al., 2023; Liu et al., 2022; Sandya et al., 2022; Tsai et al., 2023). In this sense, family caregivers' well-being has become a primary social and healthcare concern (Y.-J. Chen et al., 2023; Hu et al., 2023; Pusalkar & Majumdar, 2023). To facilitate family caregivers' well-being, enhancing their perception of the positive aspects of caregiving (PAC) is essential (Lou et al., 2014). The PAC refers to the extent to which caregiving roles are experienced and appraised as inspiring, rewarding and fulfiling, yielding positive outcomes and enriching one's lived experience (Williams, 2005; Yu et al., 2018). Two dimensions of PAC are usually researched: self-affirmation (the confident and capable self-image perceived by

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caregivers) (Tarlow et al., 2004) and outlook on life (caregivers' appraisal of interpersonal relationship enhancement and positive life orientation) (Lee et al., 2022). Prior research confirmed that the perceived PAC is positively and directly related to the well-being of family caregivers (Quinn & Toms, 2019; Tarlow et al., 2004). To help family caregivers achieve high-level PAC, extant studies extensively investigate the various potential factors, including health-related factors (e.g. perceived physical or mental health by caregivers), social factors (e.g. social support), psychological factors (e.g. experienced caregiver burden) and care recipient's conditions (e.g. Lou et al., 2014; Ar & Karanci, 2019; Lin et al., 2022). However, these current investigations rarely consider the role of digital media, such as social media, in the PAC enhancement of family caregivers.

As social media is increasingly essential for the public (He et al., 2023), including family caregivers (Teles et al., 2022), understanding the impacts of social media engagement on family caregivers' perceived PAC is critical. Social media engagement is defined as behavioural manifestations with a social media application focus that results from motivational drivers, like specific social media use behaviours (Dolan et al., 2016). With engagement in various social media applications, family caregivers seek social support, emotional expression and the companionship of others (Lau et al., 2021; Shi et al., 2019). However, research also discovers that family caregivers suffer from misinformation and uncomfortable socialisation in social media engagement, significantly reducing their social media engagement intention and satisfaction (Warner et al., 2021). With these mixed and contradicting initial findings provided by prior research, we fail to clearly understand the association between social media engagement and caregivers' perceived PAC, an important indicator of caregivers' well-being. Furthermore, these mixed findings also imply that the effect of social media engagement on family caregivers' perceived PAC could be non-linear.

However, scant studies explore or explain the relationship between social media engagement and family caregivers' well-being (e.g. PAC perception) from a non-linear perspective. This is a significant research scarcity because social media is pervasive and even essential for family caregivers and their care recipients (Huang et al., 2019). Without a clear and comprehensive understanding of whether the association between social media engagement and family caregivers' perceived PAC is non-linear or linear, we will fail to optimise the impacts of the most reachable information technology (IT) and digital media (i.e. social media) to help family caregivers appreciate their caregiving life and enhance their well-being.

To bridge the research gap and provide a clear picture of the association between social media engagement and family caregivers' well-being, this study squarely investigates the relationship between social media engagement and family caregivers' perceived PAC, an essential indicator of well-being among family caregivers. Specifically, this study extends the literature on social media engagement and family caregivers' well-being by revealing a non-linear relationship between social media engagement and family caregivers' perceived PAC. To our knowledge, this is the first research directly investigating the relationship between social media use and PAC among family caregivers, enriching or filling the blank understanding of relationships between social media engagement and family caregivers' PAC. Moreover, discovering an inverted U-shape relationship between social media engagement and family caregivers' PAC offers a novel perspective to reconcile these mixed findings provided by previous literature, suggesting a non-linear association that could explain the varying impacts of social media engagement on caregivers' well-being.

Theoretical background and research hypothesis

Based on the needs – affordance – feature perspective of social media engagement (Büttner & Rudert, 2022; Karahanna et al., 2018), social media is a viable IT-enabled approach for individuals to fulfil their basic psychological needs through the specific IT affordance and features of social media platforms. For example, many caregivers use social media to obtain encouragement and informational advice to help them perform the caregiving task better (Zang et al., 2021). This encouragement and informational advice obtained through social media engagement can benefit caregivers by influencing their self-affirmation as a dimension of PAC through self-esteem building, self-perception enhancement and a sense of competency development (Lobo et al., 2022; Mogul et al., 2020; Nagelhout et al., 2018). Also, caregivers seek social support in online communities, which helps them find a way to connect with others virtually (Trail et al., 2020). Finding a way to connect with others is critical for caregivers to enhance their interpersonal relationships with others and sense of relatedness (Karahanna et al., 2018), which is part of the outlook on life. Moreover, a sense of relatedness with other caregivers can also provide confidence in caregiving (Badr et al., 2015), which is related to the self-affirmation of PAC. In addition, the social media profile and various settings determined by the caregivers could be an alternative for them to experience a sense of autonomy in the online world (Du et al., 2020). The sense of autonomy is critical for caregivers to have a good life orientation because autonomy can help them have a sense of choice and volition in their actions in daily life (Dumont et al., 2006). However, the literature also confirms that social media engagement may lead caregivers to unexpectedly negative outcomes, such as uncomfortable socialisation and misinformation (Miller et al., 2022). Moreover, excessive social media engagement would also indicate adverse outcomes, such as social media addiction (Chen et al. 2023; Hu et al., 2023, 2023; Sun & Zhang, 2021). Thus, this implies that social media engagement may not always linearly and positively impact the caregivers' perception.

Based on the theory of social media overload (X. Chen & Wei, 2019), social media engagement initially reduces users' social overload. With the expected benefit of social media engagement for family caregivers' perceived PAC (self-affirmation and outlook on life) in the initial stage, we can observe the overall positive effect of social media engagement on caregivers' perceived PAC, as we illustrated above. However, the theory of social media overload suggests that increased engagement with social media – such as using a wider variety of platforms or spending more time online – can overwhelm users. This overload is characterised by individuals feeling as though they are providing excessive social support to others on these platforms. Furthermore, they may feel obligated to respond to requests for social support, which further contributes to the sense of overload (Maier et al., 2015; X. Chen & Wei, 2019; Zhang et al., 2016). Excessive use can lead to information overload, comparison with others and an unhealthy focus on caregiving challenges without adequate respite. This can result in increased stress and a potential decrease in the PAC as measured by self-affirmation and an outlook on life. Besides, the non-linear relationship is also common in the caregiving contexts and social media use, such as the empirical evidence about the impacts of social media engagement on users' psychological well-being (e.g. Charoensukmongkol et al., 2017; X. Chen & Wei, 2019). Also, the empirical evidence on the grandparenting hours and psychological and cognitive functional outcomes of

grandparents (e.g. Arpino & Bordone, 2014; Bowles et al., 2022) provide support in the non-linear relationship could exist in caregiving contexts.

Hence, the research hypothesis about the relationship between social media engagement (e.g. the number of social media applications used by an individual) and family caregivers is developed as follows:

- Research Hypothesis: An inverted U-shape relationship exists between social media engagement and family caregivers' perceived PAC.

Method

Participants

To verify the research hypothesis, a questionnaire-based survey was conducted among family caregivers. All family caregivers were recruited through a local non-profit organisation in Hong Kong. We selected Hong Kong because social media is highly popular in Hong Kong, and using social media is common among Hong Kong citizens. A report of Statista indicates that there were approximately 6.93 million social media users in Hong Kong in 2023, accounting for over 90% of the city's total population.[1] In addition, 91.3% of Hong Kong's population aged over 18 is active on social media as of the beginning of 2023.[2]

In this study, the operational definition for caregivers refers to adult caregivers who are taking care of any family members over 60 years old. The specific inclusion criteria are: (1) Aged 18 years old or above; (2) Caring for at least one elderly family member (over 60 years old) in the past 6 months; (3) Being able to provide the information consent form independently.

Procedure

The Ethics Review Committee of the authors' University approved this questionnaire-based survey study. The authors collaborated with a local social service organisation in Hong Kong to identify potential participants. Specifically, the organisation assisted in distributing the online survey link and consent form to family caregivers they serve (e.g. by sharing the links in their group chat and send the link directly to family caregiver by email). The survey was conducted in Hong Kong from January 18 to July 21, 2022.

In the consent form, the purpose and procedures of this survey study were carefully explained to the participants. After providing informed consent, participants who met the inclusion criteria could proceed to the questionnaire. Participation was entirely voluntary.

To ensure a high response rate, follow-up reminders were sent to participants who had not completed the survey. Measures were taken to ensure the accuracy and honesty of the responses, including assurances of anonymity and confidentiality, and clear instructions emphasising the importance of honest and accurate answers. Additionally, technical support was available to address any issues or challenges encountered during the survey period, ensuring a smooth and user-friendly experience for all participants.

Measurements

Whenever possible, previously well-validated measures were used with necessary adaptions to suit the current context. Specifically, the instruments of PAC were adapted from (Lou et al., 2014; Tarlow et al., 2004). The survey items for measuring PAC were measured on a five-point Likert scale. The range of the scale is from strongly disagree (1) to strongly agree (5). Two dimensions of PAC were measured: Self-affirmation captures the confident and capable self-image perceived by caregivers (Tarlow et al., 2004), and Outlook on Life measures caregivers' appraisal of social life's enhancement and positive life orientation) (Lou et al., 2014). The items used for measuring self-affirmation and outlook on life are displayed in Table A1 (see Appendix). Social media engagement refers to behavioural manifestations of social media, such as specific social media use behaviours (Dolan et al., 2016). To capture the social media engagement of family caregivers, we asked how many and what social media platforms (by listing the popular social media platforms as the choice candidates[3]) they are using in daily life. Socio-demographic information of family caregivers was also collected as control variables. Given that our participants are all Chinese, we applied the forward–backward approach to translating English items of the questionnaire into Chinese.

Data analysis strategy

For the significance of regression analysis, we used G*Power 3.1 to conduct the statistical power analysis (Faul et al., 2009) to estimate the minimum sample size for the data analysis – the 107 as the minimum sample size is determined by G*Power 3.1 with middle-level effect size and alpha = 0.05.

We applied the multivariate regression analysis with IBM's Statistical Package for the Social Sciences (SPSS, Version 26) to test the proposed research hypothesis (the number of social media applications utilised by a family caregiver was used as an independent variable (IV) representing family caregivers' intensity of social media engagement and family caregivers' perceived PAC as dependent variables (DV)). To allow the regression to indicate a U-shape relationship, the standard approach adopted by this study is including a quadratic term of a focal IV (i.e. the social media engagement) in the model (Lind & Mehlum, 2010). As the research hypothesis indicates the inverted U-shape relationship between social media engagement and perceived PAC, we computed and included the square of social media engagement (i.e. the quadratic term) in the model (X. Chen & Wei, 2019). For examining the inverted U-shape relationship, the inclusion of the first-order term of social media engagement in the regression model is essential, but its coefficient (whatever significant or not) did not determine the inverted U-shape relationship (Aiken & West, 1991). In contrast, if the coefficients of the quadratic term are significant and with a negative sign, the inverted U-shape relationship between the IV and DV is confirmed (Ganotakis et al., 2022; Haans et al., 2016; Lind & Mehlum, 2010; Ling et al., 2020).

The abovementioned approach was chosen for its simplicity, straightforward interpretation and effectiveness in modelling relationships where the effect increases up to a certain point and then decreases (Aiken & West, 1991; Cohen et al., 2003). While alternative methods such as piecewise regression and spline regression were considered,

the quadratic term method was deemed most appropriate for our study. Piecewise regression, although capable of modelling non-linear relationships, requires the identification of specific breakpoints, which can introduce additional assumptions about the data structure (Muggeo, 2003; Toms & Lesperance, 2003). Spline regression, while offering greater flexibility, can be computationally intensive and risks overfitting the data if not carefully controlled (MacNab & Gustafson, 2007; Zhao et al., 2023). Given these considerations, the quadratic term method (Lind & Mehlum, 2010) provides an optimal balance between model complexity and interpretability for our research objectives.

Results

Socio-demographic characteristics of the sample

Cooperating with a local social service organisation in Hong Kong, we have sent 177 survey invitations to family caregivers who receive service from this organisation (for more details, please see Section of Participants and Procedure). Finally, we obtained 125 valid responses among the 177 sent invitations, which achieved the required sample size for hypothesis verification (i.e. 107). As shown in Table 1, the average age of the family caregivers is 64.54 years old. Nearly two-thirds were women (60.0%). Most caregivers were married (60.8 %) and retired (44.8%).

Table 2 summarises social media engagement situations among 125 family caregivers. Among the sample, 44 (35.2%) of them do not use any social media, 35 (28.0%) use one social media application and 27 (21.6%) use two or three social media applications. The top three popular social media are WhatsApp, Facebook and WeChat (see Table 2). We found that caregivers who use WhatsApp display a higher level of outlook on life than those who do not use WhatsApp (independent sample t-test, mean difference, $p < 0.01$).

Measurement validation

Reliability and validity of measurement for two constructs of PAC were assessed. Confirmative factor analysis was conducted, and one item was removed due to the low factor loading. After the removal, other items' factor loading scores on their expected factors were all above 0.700 (See Table 3). Furthermore, factor loading scores were also

Table 1. Demographic information.

Variable	Indicator	N (%)	Variable	Indicator	N (%)
Gender	Male	50 (40.0)	Occupation	Full-time job	28 (22.4)
	Female	75 (60.0)		Part-time job	8 (6.4)
Age	59 years or below	42 (33.6)		Retired	56 (44.8)
	60-74 years	47 (37.6)		Unemployment	30 (24.0)
	75 years or older	36 (28.8)		Others	3 (2.4)
Marital status	Married	76 (60.8)	Living condition	Self-owned house	37 (29.6)
	Partner	19 (15.2)		Rental	81 (64.8)
	Other status	30 (24.0)		Others	7 (5.6)
Education	Primary school or no formal education	60 (48.0)	Self-rated health	Excellent	13 (10.4)
	Secondary school or higher	65 (52.0)		Good	56 (44.8)
Monthly income	Sufficient for survival or above	79 (63.2)		General	40 (32.0)
	Difficult for survival or below	46 (36.8)		Bad	16 (12.8)

Table 2. Descriptive analysis of social media engagement among family caregivers.

Social Media Engagement	Number	%	Social Media Application	Number of User	%
Do not use	44	35.2	WhatsApp	74	59.2
One application	35	28.0	Signal	7	5.6
Two applications	20	16.0	Telegram	5	4.0
Three applications	7	5.6	LINE	5	4.0
Four applications	10	8.0	Facebook	39	31.2
Five applications	2	1.6	Instagram	11	8.8
Six applications	3	2.4	Twitter	3	2.4
Seven applications	1	0.8	YouTube	23	18.4
Eight applications	0	0.0	WeChat	29	23.2
Nine application	2	1.6	QQ	3	2.4
Ten application	1	0.8	–	–	–

Table 3. Factor analysis.

Item	Self-Affirmation	Outlook on Life
1. Caring my family member makes me feel more useful	**0.881**	0.595
2. Caring my family member makes me feel good about self	**0.928**	0.605
3. Caring my family member makes me feel needed	**0.863**	0.622
4. Caring my family member makes me feel appreciated	**0.862**	0.646
5. Caring my family member makes me feel important	**0.846**	0.656
6. Caring my family member makes me feel strong and confident	**0.819**	0.649
7. Caring my family member makes me learn new skills	0.551	**0.868**
8. Caring my family member makes me appreciate life more	0.602	**0.786**
9. Caring my family member makes me more positive toward life	0.659	**0.841**
10. Caring my family member makes me strengthen relationships	0.697	**0.904**

much higher on their expected factors than on other factors. These indicate the acceptable discriminant and convergent validity of indicators (Barclay et al., 1995; Hulland, 1999).

The indicator for evaluating convergent validity is that the average variance extracted (AVE) for each construct should be equal to 0.500 or above (Fornell & Larcker, 1981). Table 4 displays that the AVE values range from 0.724 to 0.752. Furthermore, the square roots of AVE on the diagonal are all above 0.850 (see Table 4), which is greater than all other cross-correlations (Fornell & Bookstein, 1982). Thus, this indicates that all constructs captured more construct-related variance than the error variance. Besides, the heterotrait-monotrait ratio of correlation (HTMT) is below 0.900, which indicates the established discriminant validity (Hair et al., 2021). Taken together, these results demonstrate adequate convergent and discriminant validity.

Besides, construct reliability was assessed by identifying Cronbach's alpha and composite reliability scores, all of which are at or above 0.800 (see Table 4), suggesting acceptable internal consistency. Analysis results (see Table 4) showed that scores of

Table 4. Results of reliability, AVE, VIF, correlations, square root of AVE and HTMT.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE	VIF	Self-Affirmation	Outlook on Life
Self-Affirmation	0.937	0.991	0.948	0.752	2.090	**0.867**	0.777
Outlook on Life	0.904	0.817	0.913	0.724	2.102	0.714	**0.851**

Note: VIF means variance inflation factor; AVE means average variance extracted; Diagonal elements in bold font are the square roots of the AVE; The element below the diagonal is the correlation between constructs; the element above the diagonal is the HTMT indicator.

variance inflation factors (VIF) were all well within the recommended area (Hair et al., 2019). Hence, the multicollinearity problem was not likely to be a significant concern.

Regression analysis for the inverted U-shape relationship

Results of regression analysis for inverted U-shape examination are displayed in Table 5. Concretely, the squared term of social media engagement is significant and with a negative sign in the regression model where self-affirmation (a dimension of PAC) ($B = -0.632$, $p < 0.01$, $R^2 = 0.182$, Model B1), outlook on life (another dimension of PAC) ($B = -0.527$, $p < 0.05$, $R^2 = 0.187$, Model B2), or PAC ($B = -0.635$, $p < 0.01$, $R^2 = 0.195$, Model B3) are the DV, and hence supporting the research hypothesis. Furthermore, adding the squared term of social media engagement significantly increases the R-squared of the regression model (see Table 5, the comparison between Model A1, 2, 3 and Model B1, 2, 3), which indicates the need for including the squared term of social media engagement in the model.

Figure 1 plots the association between social media engagement and PAC (a), along with the associations between social media engagement and PAC's sub-dimension: self-affirmation (b) and outlook on life (c). Moreover, as a control variable, the caregiving burden was measured by the number of older adults that a family caregiver needs to provide care for, and only one control variable (i.e. self-rate health) is significant. With the coefficients of regression analysis and Figure 1's information, we can calculate that when family caregivers use three or less than three, the correlation between social media engagement and family caregivers' perception of PAC is positive. However, when the number of social media used by family caregivers exceeds three, the correlation between social media engagement and family caregivers' perception of PAC becomes negative.

Robustness check

Moreover, researchers also argue that the coefficient significance of the quadratic term is not sufficient to confirm the inverted U-shape relationship. Apart from the significance and the expected sign of the coefficient of the quadratic term, previous research also suggests additional analyses for further confirming the inverted U-shape relationship between variables. Thus, in addition to examining the coefficient's sign and significance, we further analyse the slope value at the start and end of the data range and the turning point location following the suggested procedure of Lind and Mehlum (2010).

Results for examining slope value and turning point location are shown in Table 6. For the slope value at the start and end of the data range, the slope must be sufficiently steep (i.e. significantly larger than zero, for an inverted U-shape, the slope value in the low bound should be positive, and the slope value in the high bound should be negative) at both ends of the data range (Ganotakis et al., 2022; Haans et al., 2016; Lind & Mehlum, 2010). From Table 6, we know that all slopes in the low bound are larger than 3.9 (positive value), and the slopes in the high bound are lower than −1.9 (negative value), which indicates the significant steep and expected direction of the slope in low and high bounds. Furthermore, for the turning points, its location should fall within the data range (Haans et al., 2016; Lind & Mehlum, 2010). Based on Table 6, the turning points and their 95% confidence interval (using the method of Fieller (Fieller, 1954)) all fall within the data range (i.e. [0, 10]).

Table 5. Regression analysis results.

	Self-Affirmation		Outlook on Life		Positive Aspects of Caregiving (Combined)	
Independent Variables	Model A1	Model B1	Model A2	Model B2	Model A3	Model B3
Gender	−0.057 (−0.518)	−0.019 (−0.173)	−0.120 (−0.703)	−0.088 (−0.518)	−0.090 (−1.362)	−0.052 (−0.783)
Education	−0.034 (−0.126)	−0.067 (−0.245)	0.006 (0.013)	−0.022 (−0.051)	−0.022 (−0.131)	−0.054 (−0.331)
Age	0.105 (0.027)	0.178 (0.045)	0.047 (0.008)	0.107 (0.018)	0.099 (0.042)	0.171 (0.073)
Living Condition	−0.062 (−0.508)	−0.036 (−0.297)	−0.070 (−0.371)	−0.049 (−0.257)	−0.074 (−1.011)	−0.048 (−0.657)
Occupation	−0.042 (−0.143)	−0.063 (−0.212)	0.026 (−0.068)	0.008 (0.018)	−0.013 (−0.076)	−0.034 (−0.192)
Economy	−0.115 (−0.661)	−0.131 (−0.752)	−0.128 (−0.475)	−0.141 (−0.524)	−0.148 (−1.421)	−0.164 (−1.573)
Marriage	−0.007 (−0.033)	0.010 (0.045)	0.089 (0.262)	0.103 (0.304)	0.035 (0.263)	0.052 (−0.783)
Caregiving Burden	−0.052 (−0.168)	−0.041 (−0.131)	0.048 (0.100)	0.058 (0.120)	0.003 (0.018)	0.015 (0.080)
Self-rated Health	−0.279 (−1.026)**	−0.300 (−1.103)**	−0.282 (−0.669)**	−0.299(−0.710)**	−0.295 (−1.812)**	−0.316 (−1.941)**
Social Media Engagement	−0.197 (−0.442)	0.412 (0.926)#	−0.025 (−0.037)	0.483 (0.701)*	−0.139 (−0.522)	0.473 (1.775)*
Social Media Engagement^2	–	−0.632 (−0.185)**	–	−0.527 (−0.100)*	–	−0.635 (−0.310)**
R-squared (%)	12.5	18.2	14.7	18.7	13.7	19.5
ΔR-squared (%)	5.7		4.0		5.8	
ΔR-squared Significance	0.006**		0.020*		0.005**	

Note: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

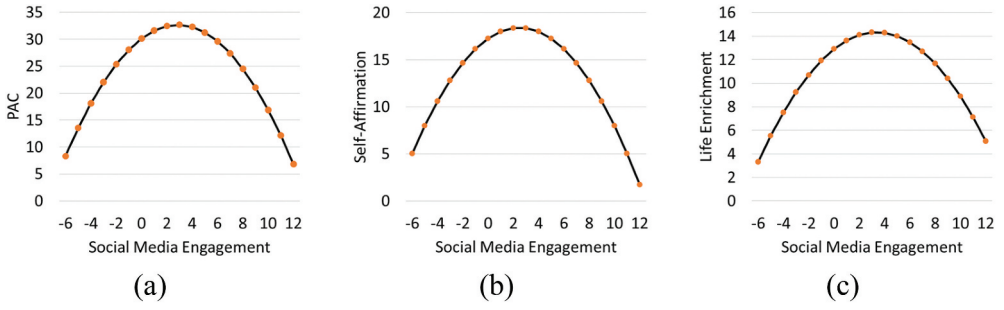

Figure 1. Inverted U-shape relationship between Social Media Engagement and positive aspects of caregiving (PAC) (a) and its subdimensions (self-affirmation (b); outlook on life (c)).

Table 6. Additional results supporting the inverted U-shape.

	Self-Affirmation	Outlook on Life	Positive Aspects of Caregiving (Combined)
Slope in Low bound	4.580	3.991	5.012
Slope in high bound	−2.208	−1.912	−2.476
Extremum point	2.240	2.467	2.331
95% confidence interval	[1.596, 2.443]	[1.887, 2.777]	[1.733, 2.634]

Note: PAC means positive aspects of caregiving.

Overall, these results further confirm the inverted U-shaped relationship between perceived PAC (including its specific sub-dimensions) and social media engagement. We also conducted the regression analysis to confirm the relationship between the cubic term of social media engagement and PAC (including its sub-dimension), which indicated an insignificant relationship. Thus, this result also supports the inverted U-shape relationship between social media engagement and the PAC as well as its sub-dimensions (Haans et al., 2016).

Discussion and implications

This study identified a non-linear relationship between family caregivers' social media engagement and their perception of the PAC. The results of regression analysis and additional robustness test indicate and confirm an inverted U-shape relationship between social media engagement and family caregivers' perceived PAC. Furthermore, we found that when family caregivers engage in one, two, or three types of social media applications, social media engagement is positively associated with family caregivers' perceived PAC. However, when the family caregivers use over three types of social media applications, the association between social media engagement and family caregivers' perceived PAC becomes negative. These results give us a more holistic picture of social media engagement's impacts on family caregivers' perceived PAC from the perspective of the number of social media applications used by the family caregivers. That is, the number of social media applications used by family caregivers displays a curvilinear effect on family caregivers' self-affirmation and their outlook on life, which partly explains the mixed findings of social media's effects on caregivers' well-being. The findings of this research indicate the theoretical implications as well as the practical implications.

Research implications

These important research implications for the theory of social work are twofold.

On the one hand, previous studies, including social work research, mainly focused on or identified social media engagement's positive or negative linear effect on users' well-being (X. Chen & Wei, 2019). For example, Karahanna et al. (2018) indicated that social media engagement could help users satisfy basic psychological needs. While research also identified that social media engagement leads to addiction (Sun & Zhang, 2021). In the caregiver context, social work studies found that the situation is similar because some specific social work research confirms the beneficial effects of social media engagement on family caregivers' well-being (e.g. Gavrila et al., 2019; O'Sullivan & Hughes, 2019), while other social work research discovers the adverse effects on family caregivers' well-being (e.g. Warner et al., 2021). This study represents an essential advancement in social work literature by challenging the conventional belief of social work research regarding the solely positive or negative linear side of social media engagement for caregivers' well-being. Specifically, based on the needs-affordances-features perspective of social media engagement (Karahanna et al., 2018) and social overload theory (X. Chen & Wei, 2019), this study developed and verified a research hypothesis to articulate an inverted U-shape relationship between social media engagement and family caregivers' perceived PAC. Thus, this study answers the question posed by earlier research: What theoretical models or interpretations can we construct to comprehend the paradoxical positive and negative effects linked with the use of digital media (Tarafdar et al., 2013), particularly in the family caregivers context. In this vein, our study theorises the paradox of social media engagement in the family caregivers' context. We provide a theoretical argument and empirical evidence of an inverted U-shape relationship between social media engagement and family caregivers' perceived PAC. This is significant for social work research focusing on caregivers' digital media engagement. Moreover, the findings of this study also suggested that social media-based intervention research (e.g. O'Sullivan & Hughes, 2019) should consider the possible non-linear impact of their social media-based intervention on the subjects.

On the other hand, one of the 17 crucial sustainable development goals (SDGs) is the well-being of humans,[4] including the well-being of family caregivers, the focal group of this study. To achieve family caregiver's well-being as part of SDGs, extant social work studies extensively investigate the various indicators from different aspects, such as social aspect (e.g. social support), health-related aspects (e.g. perceived physical or mental health by caregivers), psychological aspects (e.g. experienced caregiver burden) and aspects of care recipient's conditions (e.g. Lou et al., 2014; Ar & Karanci, 2019; Lin et al., 2022). However, this study shifts the focus of social work research from traditional indicators influencing family caregivers' well-being to the digital aspect of caregiving life. Specifically, this study investigates the relationship between family caregivers' social media engagement and their perceived PAC, which is an important reflection of family caregivers' well-being. This shift is particularly relevant and significant to social work research and practice as digital technologies have become increasingly integrated into social work research and practice, presenting both new opportunities and challenges (Pink et al., 2022; Reamer, 2013). Furthermore, this research' relevance and significance to social work research and practice is also reflected by the established role of the social worker to support and facilitate individual's meaningful relationships with their partners, family, friends, colleagues and

community, where social media is increasingly used in this relationship development (He et al., 2022; O'Leary & Tsui, 2023; Pink et al., 2022). The inverted U-shape relationship between social media engagement and family caregivers' perceived PAC indicates that the impact of digital media engagement (e.g. social media engagement) on family caregivers is not simply linear. Furthermore, as social media may share similar effects on caregivers' well-being with other digital technologies, this study also implies the potential non-linear relationship between other digital technologies and caregivers' well-being. In this case, this study serves as a commencing point that calls for further social work research to reveal more details about the roles of social media and other digital technology-related resources in family caregivers' well-being development, which helps social workers and social work researchers to achieve the optical effects of social media and other digital technology for family caregivers' well-being.

Practical implications

For practitioners, this study provides three recommendations for social workers, family caregivers and relevant social service sectors.

Firstly, this study is valuable for social workers and relevant social service sectors to consider and appreciate the dynamic role of social media in the development of family caregivers' well-being through the perception of PAC. Social workers may integrate social media engagement into their interaction with family caregivers to further facilitate social media popularity among family caregivers. For example, with the understanding of the inverted U-shape relationship between social media engagement and caregivers' perceived PAC, we recommend that the social worker and relevant social service sectors consider social media-enabled programs, training sessions and information release formats (e.g. sending warm greeting messages via social media) for family caregivers to reduce their psychological distress and improve well-being (Golboni et al., 2023; O'Sullivan & Hughes, 2019).

Secondly, the inverted U-shaped relationship also reminds us that social workers and family caregivers should be aware of the extent of their social media engagement to avoid the possible negative impacts of social media on the perception of PAC. Based on our research findings, we recommend that family caregivers use less than three social media applications in their daily lives to ensure the positive effect of social media on their perceived PAC.

Last but not least, among our participants in this study, we found that there were 44 family caregivers (35.2%, see Table 2) who did not use any social media application, which indicates the potential digital divide among family caregivers regarding social media use in the Asia Pacific region (Maji & Laha, 2022). Thus, we also recommended that social workers and relevant social service sectors keep promoting the use of social media among family caregivers to reduce the potential digital divide and gap among family caregivers, given the potentially positive benefits to caregivers' well-being evidenced by this study.

Limitations and future research improvement

This study has several limitations that need future research to improve further.

First, the scope for generalising the findings is limited due to the small sample size. The current research findings are based on the small sample size. A small sample size increases the likelihood that the sample does not capture the full variability of the caregiver population, which indicates the limited representation of the sample and the generalisability of the findings. Although we have conducted the robustness examination to ensure the results' stability, the small sample size and non-random sampling still potentially make the results less precise and biased. Due to the small sample size, we cannot perform further subgroup analysis, which means that essential differences between different groups within the sample could be missed. In this case, the findings' generalisability, further meaningful subgroup analysis and findings triangulation are necessary to be enhanced by conducting a further study with a larger sample size.

Second, the findings also suffer limitations due to the non-random sampling approach (i.e. convenient sampling method). We acknowledge that the convenience sampling method used to recruit family caregivers through a local non-profit organisation may introduce biases, as the sample may not fully represent the entire population of family caregivers. Even though this is the common sampling method, this method might lead to an overrepresentation or underrepresentation of certain characteristics within the sample, thereby affecting the generalisability and external validity of the findings. Furthermore, the results of sensitivity analyses (please refer to Tables A2 and A3 in appendices), indicate that all results align with the conclusion of Table 5, except the results of the inverted U-shaped relationship between outlook on life and social media engagement. Table A3 indicates that the inverted U-shaped relationship between outlook on life and social media engagement is sensitive to the sample constitution change (in the analysis, we change the sample constitution by excluding the caregivers who do not use social media). Thus, when interpreting the results of outlook on life, we keep this result is sensitive to sample change in mind which may attribute to the convenient sampling bias. Also, future research could consider the following methods to mitigate the biases introduced by convenience sampling: Weighting Adjustments, Sensitivity Analyses and Multistage Sampling. Due to the small sample size in our current study, we were unable to perform these analyses. However, future studies with larger sample sizes should consider these strategies to improve the rigour and credibility of their findings. Also, we recommend that future research adopt random sampling methods to recruit a broader and more representative sample of family caregivers, which would enhance the generalisability and external validity of the findings.

Third, the measurement of social media engagement in this study is preliminary, as we only measured the number of social media platforms used by the caregivers. Therefore, future research should adopt more comprehensive approaches to gain deeper insights into social media engagement. Specifically, future studies on social media engagement and family caregivers' well-being could measure variables such as the time spent on social media, the types of activities performed, the types of social media used and caregivers' commitment to online communities. Additionally, employing a well-established social media engagement scale, such as the Facebook Intensity Scale (Ellison et al., 2007), could provide a more robust assessment in future studies.

Additionally, the present research only centres on the family caregivers' perceived PAC as an essential indicator of well-being. In this case, it is also challenging to generalise the findings of this study to the positive attitude towards caregiving and even to the overall well-being of family caregivers. Thus, it is necessary for future studies to consider

a broader range of indicators of family caregivers' well-being, such as life satisfaction (Diener et al., 1985), subjective vitality (Ryan & Frederick, 1997), or happiness (Hills & Argyle, 2002), to discover a more comprehensive understanding of social media's impact on family caregivers' well-being. Also, future studies could adopt multiple indicators for measuring well-being in one research design, which will increase the comprehensiveness of well-being measurement. In addition, it is also necessary for us to call for more rigorous studies to support and enrich the critical findings of this study. Specifically, future studies should try to replicate our results with more diverse groups from other regions and countries in Asia and the Pacific, such as caregivers of care recipients with different features (e.g. dementia). Moreover, future studies could also consider using more sophisticated data analysis techniques or mixed-method research designs (e.g. structural equation modelling plus qualitative comparative analysis) to enrich the findings of this study.

Last but not least, the data collection relied on cross-sectional self-report measures, which involve the likelihood of recall bias or social desirability bias due to the subjective nature of self-report data. Thus, it is necessary for future studies to develop this relationship between social media and caregivers' well-being by using secondary data or other objective data, such as caregivers' actual behavioural data on social media use. Also, the cross-sectional design only reveals the preliminary short-term effect of social media on caregivers' well-being. Therefore, it is necessary for future research to consider the longitudinal (e.g. the diary study approach) or experimental design for the impact of social media engagement on family caregivers to uncover the long-term effects of social media as it may be different from the short-term effect found in this study.

Conclusion

This research focuses on the role of social media engagement in family caregivers' perceived PAC, an essential indicator of family caregivers' well-being. A questionnaire-based survey is conducted to help us discover an inverted U-shape relationship between social media engagement and family caregivers' perceived PAC. The results of this research enrich the knowledge of research and practice regarding caregiver-centric IT use and social work, which helps us to effectively achieve the benefits from a comprehensive digitalisation of the healthcare and social care system for our society.

Notes

1. Data Source: https://www.statista.com/study/132125/social-media-in-hong-kong/
2. Data source: https://www.meltwater.com/en/blog/social-media-statistics-hong-kong
3. Social media applications for selection: WhatsApp, Signal, Telegram, LINE, Facebook, Instagram, Twitter, YouTube, WeChat, and QQ.
4. https://sdgs.un.org/goals

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Declaration of conflicting interests

Both authors declared no potential conflicts of interest with respect to this research.

Ethical approval

This study was approved by the Human Research Ethics Committee of the University of Hong Kong (EA210493).

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Appendix

Table A1. Items used in the study (positive aspect of caregiving).

Caring my family member makes me (adapted from Tarlow et al., 2004):	
Self-affirmation	Feel more useful
	Feel good about self
	Feel needed
	Feel appreciated
	Feel important
	Feel strong and confident
Outlook on life	Learn new skills
	Appreciate life more
	More positive towards life
	Strengthened relationships

Table A2. Results of sensitivity analysis I (adjusting the sample by excluding baseline group (caregivers who do not use social media), $N = 81$).

Independent variable	Self-Affirmation	Outlook on Life	Positive Aspects of Caregiving (Combined)
Gender	−0.143	−0.129	−0.745
Education	−0.142	−0.009	−0.225
Age	0.060	0.008	0.108
Living Condition	−0.665	0.030	−0.690
Occupation	−0.230	−0.101	−0.671
Economy	−0.508	−0.131	−1.347
Marriage	0.220	0.117	0.729
Caregiving Burden	−0.119	0.055	0.189
Self-rated Health	−1.664**	−0.252**	−2.877**
Social Media Engagement	1.492	0.127	2.242
Social Media Engagement^2	−0.252*	−0.021	−0.374*

Note: **$p < 0.01$, *$p < 0.05$.

Table A3. Results of sensitivity analysis II (adjusting regression model structure by removing control variable, $N = 125$).

Independent variable	Self-Affirmation	Outlook on Life	Positive Aspects of Caregiving (Combined)
Social Media Engagement	0.714	0.188*	1.590
Social Media Engagement^2	−0.142*	−0.022*	−0.247*

Note: **$p < 0.01$, *$p < 0.05$.