Social support and posttraumatic growth in a longitudinal study of people living with HIV: the mediating role of positive affect

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ABSTRACT
Background: Psychological research in people living with HIV (PLWH) has been dominated by studies on the negative consequences of HIV infection. However, recently, positive changes following the diagnosis of HIV have been examined, namely the phenomenon of posttraumatic growth (PTG).

Objectives: The aim of this one-year longitudinal study was to investigate the level of PTG and its relationship with social support dimensions (perceived support, need for support, actually received support) and positive and negative affect among PLWH. Specifically, this study explored the mediating role of positive and negative affect in the link between social support and PTG.

Method: Participants filled out the following psychometric tools: Posttraumatic Growth Inventory (PTGI), Berlin Social Support Scales (BSSS) and Positive and Negative Affect Schedule (PANAS-X). Three assessments were performed. Altogether, 129 patients were recruited for the first assessment, 106 patients participated in the second assessment and 82 participants (63.6%) out of the initial sample of 129 participated in all three assessments.

Results: The positive relationship between all examined social support dimensions and PTG was entirely mediated by positive affect. There was no association between negative affect and PTG. Selected socio-medical covariates (sex, employment, higher education, being in a stable relationship and HIV/AIDS status) were related to social support and PTG among participants.

Conclusions: This study points to the need for more research on positive aspects of HIV/AIDS, notably PTG. More specifically, interventions focused on enhancement and sustainment of positive affect among PLWH should be an adjunct to traditional mental health screening among this patient group.

Keywords: Social support; posttraumatic growth; positive affect; negative affect

PALABRAS CLAVE
VIH/SIDA; crecimiento postraumático; apoyo social; emoción positiva; emoción negativa

HIGHLIGHTS
- This is one of the few longitudinal studies on posttraumatic growth (PTG) among HIV-infected people.
- Social support was positively related to PTG when mediated by positive affect.
- There is a need of more research on positive aspects of HIV/AIDS.
- Clinical interventions should be focused on enhancement positive affect among HIV-infected people.

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More than two decades ago, Tedeschi and Calhoun (1996) introduced the term posttraumatic growth (PTG), which has since garnered a great deal of interest among researchers and clinicians describing positive changes among survivors of traumatic life events (e.g., Helgeson, Reynolds, & Tomich, 2006; Prati & Pietrantoni, 2009). There is no consensus regarding whether PTG represents an outcome of dealing with traumatic events (Tedeschi & Calhoun, 2004), is an active coping strategy (Tennen & Affleck, 2002) or serves even as a positive illusion (Maercker & Zoellner, 2004). However, most researchers mentioned above report similar changes – including more satisfying interpersonal relationships, finding new life possibilities, greater appreciation of life, openness to spiritual issues and enhanced perception of personal strength – in people exposed to adverse life events. Despite the existence in the literature of other terms describing positive changes after trauma and adversity, such as stress-related growth (Siegel & Schrimshaw, 2000), adversarial growth (Linley & Joseph, 2004) or benefit finding (Danoff-Burg & Revenson, 2005), Tedeschi and Calhoun (2004) distinguished them from PTG. Specifically, PTG occurs with attempts at adapting to an event that is challenging enough to induce a transformation of life and a change in one’s basic life values. Several researchers have observed that this kind of challenging event, which may often trigger growth, is usually a diagnosis accompanied by a struggle with a life-threatening illness (Heffron, Grealy, & Mutrie, 2009; Sawyer, Ayers, & Field, 2010).

The diagnosis, treatment and subsequent life with a potentially terminal and still highly stigmatized disease, such as HIV/AIDS, constitutes a major stressor, which, according to several authors (e.g. Adewuya et al., 2009; Machtinger, Wilson, Haberer, & Weiss, 2012; Martin & Kagee, 2011; Rzeszutek, Oniszczenko, Żebrowska, & Firlag-Burkacka, 2015; Theuninck, Lake, & Gibson, 2010), meets the criteria of traumatic stressor. The prevalence of HIV-related posttraumatic stress disorder (PTSD) among people living with HIV (PLWH), which stems from receiving a diagnosis of potentially lethal virus in the body and related perceived threat to life, ranges between 30 and 64% (Olley, Zeier, Seedat, & Stein, 2005; Sherr et al., 2011). Nevertheless, some studies also found positive changes following the diagnosis of HIV infection, which comprise the aforementioned dimensions of PTG (Milam, 2004, 2006; Murphy & Hevey, 2013; Rzeszutek, Oniszczenko, & Firlag-Burkacka, 2017; Siegel, Schrimshaw, & Pretter, 2005). For example, Milam (2004) noted that 59% of PLWH experienced some aspects of PTG following their HIV diagnosis, and that those positive changes were negatively associated with the level of depression as well as an improved viral load in this patient group. Luszczynska, Sarkar, and Knoll (2007) observed that PTG was associated with better adherence to treatment among PLWH. Although an increasing number of researchers also highlight positive consequences regarding HIV infection, the nature of PTG among PLWH remains unclear; in particular, researchers investigating PTG among PLWH concentrate primarily on documenting these positive changes, and little attention has been paid to variables that may facilitate or hinder PTG in this patient group (Sawyer et al., 2010). In this study, the relationship between social support and PTG in a one-year longitudinal study of PLWH was examined. In addition, the study investigated whether positive and negative affect may mediate the aforementioned relationship among participants.

Social support, particularly that received from a partner, family or friends (see, ‘supportive others’; Tedeschi & Calhoun, 2004, p. 8) plays a vital role in facilitating PTG by mobilizing cognitive processing after trauma, i.e. fostering ruminative activity (Tedeschi & Calhoun, 2004). The aforementioned positive effect of social
support on PTG was observed especially after catastrophic traumatic events, such as an earthquake (Jia, Ying, Zhou, Wu, & Chongde, 2015), flood (Dursun, Steger, Bentele, & Schulenberg, 2016) or terrorist attack (Páez, Basabe, Ubillos, & González, 2007). In addition, perceived social support was related to levels of PTG among people who have recovered from addiction (Haroosh & Freedman, 2017). However, the research on social support and PTG in the context of life-threatening illness remains inconclusive. On the one hand, support seeking (Kent et al., 2013) and received social support (Schroevers, Helgeson, Sanderman, & Ranchor, 2010) were positively related to PTG among some cancer patients. Conversely, the link between social support and PTG was not found among cardiac patients (Sheikh, 2004) and other studies conducted on cancer patients (Sears, Stanton, & Danoff-Burg, 2003). Regarding PLWH, Siegel et al. (2005) observed a positive association between emotional support and PTG among HIV-infected women, while Rzeszutek et al. (2017) observed a direct positive effect of received support on PTG in a longitudinal study. In contrast, Cieslak et al. (2009), in a study of PLWH who survived Hurricane Katrina, found that received support did not predict the total PTG level and that it was positively related only to one PTG dimension, namely, relating to others. Thus, the picture of the link between social support and PTG in cases of life-threatening illness is ambiguous and needs further investigation. In particular, according to Schroevers et al. (2010), these inconsistent results may be attributed to the use of different dimensions of social support and the dominance of cross-sectional studies in this area. In this study, this gap was addressed by analysing various dimensions of social support in relation to PTG in a longitudinal study design.

In Tedeschi and Calhoun’s (2004) PTG model, an appropriate emotion regulation, especially maintaining a high level of positive affect, may indirectly foster growth by managing psychological distress and stimulating the search for meaning after trauma. Linley and Joseph (2004), in a meta-analytic review, noted that PTG is significantly associated with a high intensity of positive affect. More specifically, positive affect turned out to be a mediator variable between PTG and personal resources, namely, self-efficacy (Yu et al., 2014) as well as ruminations and meaning (Boyzraz & Efstathiou, 2011). Conversely, maintaining a heightened level of negative affect not only hinders PTG (Boyaraz, Horne, & Sayger, 2010), it also deteriorates well-being (Gross & John, 2003). Nevertheless, some studies also indicate that PTG is linked only to a greater level of positive affect and is unrelated to negative affect (Schroevers et al., 2010; Yu et al., 2014). Finally, although the literature on HIV/AIDS is replete with examples of how negative affect, i.e. HIV-related distress impacts PLWH’s well-being and physical health (e.g. Chida & Vedhara, 2009; Ikovichs et al., 2006; Leserman, 2008), very little is known about the role of positive emotions in various aspects of functioning among this patient group, making this topic a candidate for further investigation (Ironson & Hayward, 2008; Moskowitz et al., 2017).

1. Current study

The aim of this one-year longitudinal study was to investigate the level of PTG and its relationship with social support (perceived support, need for support, actually received support) and positive and negative affect among PLWH, while also controlling for selected socio-medical covariates (see Method). In particular, a mediating role of positive and negative affect in the link between social support and PTG was explored. The following hypotheses were formulated in a longitudinal study design (Fitzmaurice, Laird, & Ware, 2011):

1. A direct and indirect positive relationship was expected between the level of social support (perceived support, need for support, actually received support) and positive and negative affect among PLWH, while also controlling for selected socio-medical covariates (see Method). In particular, a mediating role of positive and negative affect in the link between social support and PTG was explored. The following hypotheses were formulated in a longitudinal study design (Fitzmaurice, Laird, & Ware, 2011):

(1) A direct and indirect positive relationship was expected between the level of social support (perceived support, need for support, actually received support) in the first assessment, and the intensity of PTG in the third assessment, while also controlling for the level of PTG in the first assessment.

(2) It was expected that positive and negative affect would partially mediate the relationship described by the first hypothesis.

Based on the aforementioned hypotheses, a preliminary path model was constructed (see Figure 1).
2. Method

2.1. Participants

The study was conducted on patients at the Hospital of Infectious Diseases in Warsaw. The participants filled out a paper-and-pencil version of the questionnaire and participated in the study voluntarily, as there was no remuneration for participation. The eligibility criteria encompassed participants 18 years or older, a confirmed medical diagnosis of HIV infection and receiving care from the hospital where the study was conducted. The exclusion criteria included HIV-related cognitive disorders, which were screened by psychiatrists working at this hospital. The research project was accepted by the ethics committee.

The first assessment was performed between June and July 2016. A total of 129 participants were recruited to take part in the longitudinal project, i.e. those patients not only agreed to complete the questionnaires and left their contact details (i.e. telephone number and/or email address) so that the author of the study could contact them for the subsequent assessments, but they also highlighted in the Posttraumatic Growth Inventory (see, Measures) that the diagnosis of HIV infection was a traumatic event for them. The second assessment was performed between January and February 2017. Out of 129 participants from the first wave, 106 participated in the second assessment. Finally, the last assessment was conducted between May and June 2017, and 82 participants (63.6%) out of the initial sample of 129 participated in all three assessments. No missing data in the final sample of 82 participants was observed. Table 1 presents the socio-medical data in the final sample of 82 study participants and in the group of participants who did not participate in three assessments (drop-out).

There were no statistically significant differences between the two samples in terms of socio-medical variables. There were also no statistical differences between the two samples in terms of psychological variables (Table 2).

2.2. Measures

To measure the intensity of PTG, a Polish adaptation of the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) was used. It is important to underline that although the original PTGI comprises five specific domains of PTG (‘relating to others’, ‘new possibilities’, ‘personal strength’, ‘spiritual change’ and ‘appreciation of life’), the Polish adaptation of the PTGI assesses only four domains of PTG. Exploratory and confirmatory factor analysis revealed a four-factor structure for the PTG, including changes in self-perception (‘perceiving new possibilities, feeling of personal strength’), changes in relationships with others (‘feelings of greater connection with other people, increase in empathy, altruism’), greater appreciation for life (‘changes in life philosophy

Table 1. Socio-medical variables in the studied final sample (N = 82) and in the drop-out group (N = 47).

| Variable                              | Drop-out (N = 47) | Final sample (N = 82) | χ²/T   | df  | ρ   |
|---------------------------------------|-------------------|-----------------------|--------|-----|-----|
| Sex                                   |                   |                       |        |     |     |
| Male                                  | 40 (85.1%)        | 70 (85.4%)            | χ² = .01 | 1   | .968|
| Female                                | 7 (14.9%)         | 12 (14.6%)            |        |     |     |
| Age (in years)                        | 19–58             | 21–76                 | T = .62 | 127 | .539|
| (M ± SD)                              | 39.32 ± 8.42      | 40.50 ± 11.47         |        |     |     |
| Relationship status                   |                   |                       |        |     |     |
| Stable relationship                   | 26 (55.3%)        | 49 (59.8%)            | χ² = .24 | 1    | .623|
| Lack of stable relationship           | 21 (44.7%)        | 33 (40.2%)            |        |     |     |
| Education                             |                   |                       |        |     |     |
| Elementary                            | 7 (14.9%)         | 5 (6%)                | χ² = 3.58 | 2 | .167|
| Secondary                             | 17 (36.2%)        | 26 (31.7%)            |        |     |     |
| University degree                     | 23 (48.9%)        | 51 (62.3%)            |        |     |     |
| Employment                            |                   |                       |        |     |     |
| Full employment                       | 38 (80.9%)        | 53 (64.6%)            | χ² = 4.26 | 2 | .119|
| Unemployment                          | 6 (12.8%)         | 23 (28.1%)            |        |     |     |
| Retirement                            | 3 (6.4%)          | 6 (7.3%)              |        |     |     |
| HIV/AIDS status                       |                   |                       |        |     |     |
| HIV+ only                             | 42 (89.4%)        | 66 (80.5%)            | χ² = 1.73 | 1 | .189|
| HIV/AIDS                              | 5 (10.6%)         | 16 (19.5%)            |        |     |     |
| HIV infection duration in years       |                   |                       |        |     |     |
| Range                                 | 1–27              | 1–30                  | T = -.68 | 127 | .498|
| (M ± SD)                              | 6.64 ± 6.58       | 7.39 ± 5.72           |        |     |     |
| Antiretroviral Treatment (ART) duration in years |        |                       |        |     |     |
| Range                                 | 1–22              | 1–21                  | T = -.90 | 127 | .369|
| (M ± SD)                              | 4.96 ± 4.77       | 5.76 ± 4.88           |        |     |     |
| CD4 Count                             | 200–1200          | 200–2000              | T = -.193 | 127 | .056|
| (M ± SD)                              | 559.04 ± 225.24   | 645.73 ± 256.23      |        |     |     |

M = Mean; SD = Standard Deviation; T = value of Independent samples t-test; df = degrees of freedom; ρ = Statistical Significance for Independent samples t-test for Interval Scales or Pearson’s χ² Test For Categorical Variables.
Table 2. Mean values of PTGI, PANAS and BSSS in the studied final sample (N = 82) and in the drop-out group (N = 47).

|                      | Drop-out (N = 47) | Final sample (N = 82) | t-test | p     |
|----------------------|-------------------|-----------------------|--------|-------|
| PTG                  | 58.91 (24.56)     | 61.24 (22.19)         | −.55   | .582  |
| Positive Affect      | 3.47 (0.61)       | 3.41 (0.69)           | .51    | .613  |
| Negative Affect      | 2.49 (0.98)       | 2.25 (0.92)           | 1.35   | .179  |
| Perceived Support    | 19.30 (4.77)      | 18.65 (5.33)          | .69    | .489  |
| Need for Support     | 7.17 (2.97)       | 7.36 (2.38)           | −.38   | .702  |
| Actually Received    | 30.94 (9.13)      | 29.48 (10.31)         | .81    | .421  |

SD = Standard Deviation; t = Value of independent samples t-test; p = Statistical Significance; a = df (Degrees of Freedom) = 127.

and current life goals, greater appreciation for every day) and spiritual changes (‘better understanding of spiritual issues, increase in religiousness’). In the PTGI, participants rate 21 positive statements that describe various changes resulting from traumatic or highly stressful events, which are mentioned at the beginning of the inventory. The participants were instructed to focus on their HIV infection as the example of a traumatic event. The statistical analysis is usually performed only for the global PTG score (sum of all items), as particular subscales in the Polish version of PTGI are highly intercorrelated (Ogińska-Bulik & Juczyński, 2010). In addition, according to Park and Helgeson (2006), the aforementioned unifactorial assessment of PTG represents a more valid way to measure PTG compared to analysing various dimensions of growth, which may vary from study to study, even when researchers use the same PTG questionnaire. Cronbach’s α in the studied final sample at the third assessment for the whole scale was α = .86 and, for the four subscales, it varied between .81 and 85.

Social support was assessed with Schulz and Schwarzer’s (2003) Berlin Social Support Scales (BSSS), adapted in Polish by Łuszczyńska, Kowalska, Mazurkiewicz, and Schwarzer (2006). It evaluates a broad range of support dimensions and, in this study, three social support scales were used: perceived support, need for support and actually received support. The psychometric properties of the Polish version of the BSSS have been assessed on various groups of patients, including those having undergone bypass operations or following heart attacks, and patients with chronic, degenerative spinal diseases (Łuszczyńska et al., 2006). These studies have thus resulted in the confirmation of satisfactory reliability and validity. Cronbach’s α reliability coefficients for all scales in the final sample at the third assessment were satisfactory, ranging between .83 and .87.

In order to assess positive and negative affect, a Polish adaptation (Brzozowski, 2010) of the PANAS-X was used (Watson, Clark, & Tellegen, 1988). The PANAS-X comprises 10 adjectives for positive affect (e.g. proud, excited, etc.) and 10 for negative affect (e.g. frightened, hostile, etc.). The participants were asked to rate their general affective states on a five-point response scale from 1 (not at all) to 5 (extremely). The Cronbach’s α coefficients in the studied final sample at the third assessment were .81 for the positive affect subscale and .83 for the negative affect subscale.

Socio-medical covariates were assessed via separate survey. More specifically, participants’ age, CD4 count and antiretroviral treatment duration were continuous variables. Participants’ sex, relationship status and HIV/AIDS status were dichotomous variables. Finally, employment and education were categorical variables. All the categories of these covariates are described in Table 1.

3. Data analysis

The data analysis consisted of three stages and was conducted on the final sample of 82 participants. Each variable was measured three times. First, possible differences between the three assessments were examined. With the use of repeated measures ANOVA followed by multiple comparisons performed with Bonferroni correction, changes in the analysed variables in time were shown. Possible changes in three time points were analysed in all examined variables. Second, control variables were selected from the socio-medical data. Multiple regression analysis via the stepwise method was used to select statistically significant covariates for the analysed variables. There were six regression models, a separate regression model for each analysed variable. Finally, path analysis was performed to verify the preliminary model depicted in Figure 1, with consideration of selected socio-medical data. Each type of social support (perceived support, need for support, actually received support) was analysed in a separate model. In the statistical analysis, the IBM SPSS 24 and IBM AMOS 24 statistical packages were used (IBM Corp. Released, 2016).

4. Results

The results of changes in the three assessments with respect to the variables in the PTGI, PANAS and BSSS are presented in Table 3. There were no statistically significant changes across the three assessments with respect to all analysed variables. Table 3 presents values of Kolmogorov-Smirnov normality test. None of the analysed variables significantly differed from the normal distribution (Table 4).

Second, the control variables were selected from the socio-medical data. It is important to note that there were no changes over the three time points for
Table 3. Changes in three assessments with respect to variables in the PTGI, PANAS and BSST with results of repeated measures ANOVA.

| Variables                  | Mean (SD) | Overall | T1 vs. T2 | T2 vs. T3 | T1 vs. T3 |
|----------------------------|-----------|---------|-----------|-----------|-----------|
| PTG                        | 61.24 (22.19) | F(2,162) = 1.53 | .280 | .999 | .999 |
| Positive Affect            | 3.41 (6.9) | p = .220 | .999 | .932 | .999 |
| Negative Affect            | 2.25 (92) | p = .603 | .999 | .999 | .999 |
| Perceived Support          | 18.65 (5.33) | F(2,162) = .48 | .999 | .999 | .999 |
| Need for Support           | 7.36 (2.38) | p = .621 | .999 | .999 | .999 |
| Actually Received Support  | 29.48 (10.31) | F(2,162) = 2.11 | .331 | .237 | .999 |

**SD = Standard Deviation; T1 = First Assessment; T2 = Second Assessment; T3 = Third Assessment; Z = value of Kolmogorow-Smirnow normality test; * = p Values Of Repeated Measures Analyses Of Variance and Bonferroni’s Multiple Comparisons.

Table 4. Results of multiple regression analysis. Selection of control variables out of socio-medical data.

| Assessment                  | Predictor               | B   | Beta | t   | p   | ΔF  | df  | p   | ΔR² |
|-----------------------------|-------------------------|-----|------|-----|-----|-----|-----|-----|-----|
| Perceived Support           | First Higher Education  | .403| .37  | 3.56| .001| 12.70| 1.80 | .001| .14 |
| Need For Support            | First Sex               | .74 | .24  | 2.23| .028| 4.98 | 1.80 | .028| .06 |
| Actually Received Support   | First Lack Of Stable Relationship | -.53| -.27| -2.57| .012| 8.74 | 1.80 | .004| .10 |
| Positive Affect             | Second HIV/AIDS Status  | -.55| -.29| -2.73| .008| 7.45 | 1.80 | .008| .09 |
| Negative Affect             | Second Employment       | -.45| -.25| -2.31| .024| 5.33 | 1.80 | .024| .06 |
| PTG                         | Third HIV/AIDS Status   | -18.17| -.35| -3.37| .001| 11.37| 1.80 | .001| .12 |

Table 5. Correlations between analysed variables included in path analysis.

| Variables                  | Assessment | 1.    | 2.    | 3.    | 4.    | 5.    | 6.    |
|----------------------------|------------|-------|-------|-------|-------|-------|-------|
| (1) Perceived Support      | First      | –     | .484**| .672**| .221* | -.276*| .140  |
| (2) Need For Support       | First      | –     | –     | .478**| .360**| -.088 | .302**|
| (3) Actually Received Support | First    | –     | –     | –     | .254*| -.155 | .116  |
| (4) Positive Affect        | Second     | –     | –     | –     | .012 | –     | .292**|
| (5) Negative Affect        | Second     | –     | –     | –     | –    | –     | –     |
| (6) PTG                    | Third      | –     | –     | –     | –    | –     | –     |

*p < .05; **p < .01.
support, received support and PTG. There were also no relationships between need for support, received support and negative affect. Therefore, these paths were eliminated from the models. The final models are presented in Figure 2, 3 and 4.

Figure 2 presents the final model for perceived support. The values of the goodness of fit indices suggest that the model was very satisfactory, \( \chi^2 (34) = 38.43, p > .05; \) CFI = .97; RMSEA = .04; AGFI = .87. The final model explained 34.7% of the variance of the global PTG level in the third assessment. Perceived support in the first assessment had a positive impact on positive affect in the second assessment, and positive affect in the second assessment had a positive impact on PTG in the third assessment when controlling for PTG in the first measurement. Thus, there was full mediation between perceived support in the first assessment and PTG in the third assessment via positive affect in the second assessment. Higher education support was positively related to perceived support in the first assessment. Employment was negatively related to negative affect in the second assessment. HIV/AIDS status was negatively related to positive affect in the second assessment and to PTG in the third assessment. There was a positive relationship between higher education and employment. Women had higher PTG in the first assessment than men.

Figure 3 presents the final model for need for support. The values of the goodness of fit indices suggest that this model was also very satisfactory, \( \chi^2 (27) = 20.65, p > .05; \) CFI = .99; RMSEA = .01; AGFI = .91. The final model explained 34.5% of the variance of the global PTG level in the third assessment. Need for support in the first assessment also had a positive impact on positive affect in the second assessment, and positive affect in the second assessment had a positive impact on PTG in the third assessment when controlling for PTG in the first assessment. Thus, there was full mediation between need for support in the first assessment and PTG in the third assessment via positive affect in the second assessment. Need for support in the first assessment also had a positive impact on positive affect in the second assessment, and positive affect in the second assessment had a positive impact on PTG in the third assessment when controlling for PTG in the first assessment. Thus, there was full mediation between need for support in the first assessment and PTG in the third assessment via positive affect in the second assessment. Need for support was positively related to perceived support in the first assessment. Employment was negatively related to negative affect in the second assessment. HIV/AIDS status was negatively related to positive affect in the second assessment and to PTG in the third assessment. There was a positive relationship between higher education and employment. Women had higher PTG in the first assessment than men.
Figure 3. The final model of the relationship between PTG and need for support, positive and negative affect with regression coefficients.

Note. T1 = First Assessment; T2 = Second Assessment; T3 = Third Assessment.
*p < .05; **p < .01; ***p < .001.

Figure 4. The final model of the relationship between PTG and actually received support, positive and negative affect with regression coefficients.

Note. T1 = First Assessment; T2 = Second Assessment; T3 = Third Assessment.
*p < .05; **p < .01; ***p < .001.
support in the first assessment was not related to negative affect in the second assessment. Employment was negatively related to negative affect in the second assessment. HIV/AIDS status was negatively related to positive affect in the second measurement and to PTG in the third measurement. Women had a significantly higher need for support than men and higher levels of PTG in the first assessment than men.

Figure 4 presents the final model for received support. The values of the goodness of fit indices suggest that this model was also very satisfactory, $\chi^2(43) = 46.29, p > .05$; CFI = .98; RMSEA = .03; AGFI = .86. The final model explained 34.6% of the variance of the global PTG level in the third assessment. Received support in the first assessment also had a positive impact on positive affect in the second assessment, and positive affect in the second assessment had a positive impact on PTG in the third assessment when controlling for PTG in the first assessment. Thus, there was full mediation between received support in the first assessment and PTG in the third measurement via positive affect in the second assessment. The value of one-tailed Sobel test calculated on regression coefficients acquired in the model in which negative affect was also controlled for was statistically significant, $Z = 1.85, p < .05$. Received support in the first assessment was not related to negative affect in the second assessment. Higher education was positively related to received support in the first assessment, while lack of a stable relationship was negatively related to received support in the first measurement. Employment was negatively related to negative affect in the second assessment. HIV/AIDS status was negatively related to positive affect in the second assessment and to PTG in the third assessment. Lack of a stable relationship in the first assessment was negatively related to employment in the second assessment. There was also a positive relationship between higher education and employment. Women had higher levels of PTG in the first assessment than men.

5. Discussion

The aim of this one-year longitudinal study was to investigate the level of PTG and its relationship with social support dimensions and positive and negative affect among PLWH. In particular, this study explored the mediating role of positive and negative affect in the link between social support and PTG. The first hypothesis was partially confirmed, as only an indirect link was observed between all examined social support dimensions and the level of PTG among the participants. Similarly, the second hypothesis was also somewhat confirmed, as positive affect, but not negative affect, completely mediated the aforementioned relationship. It seems that the study participants who perceived, received or had higher needs of social support at the baseline experienced more positive emotions over time, which in turn was positively related to the level of PTG in the third assessment. This result may indicate an important mechanism linking social support to PTG in the aftermath of life threatening illness, especially that the nature and direction of this relationship is ambiguous (e.g. Cieslak et al., 2009; Rzeszutek et al., 2017; Sheikh, 2004). As noted earlier in Tedeschi and Callhoun’s (2004) model, social support facilitates PTG by mobilizing cognitive processing after trauma; it also stimulates meaning searching after trauma. At the same time, in the aforementioned theoretical model, adequate emotion regulation, especially maintaining a high level of positive affect, is crucial for meaning searching after trauma and in facilitating growth. More specifically, Boyraz and Efthathiou (2011) observed that positive affect mediated the link between self-focusing tendencies (ruminations), meaning in life and PTG among bereaved women. Some researchers even highlighted common neural mechanisms of PTG and positive affect, i.e. increased left frontal brain activity (Rabe, Zöllner, Maercker, & Karl, 2006). Conversely, the lack of a relationship between social support, PTG and negative affect was intriguing, as high levels of negative affect occurred to hinder PTG in some studies (Boyraz et al., 2010). Nevertheless, some researchers observed that PTG is associated only with a greater level of positive affect, but not with negative affect (Schroevers et al., 2010; Yu et al., 2014).

In discussing the aforementioned results in the context of PLWH, it should be noted that numerous researchers observed that social support not only enhances well-being, i.e. protects from depression and an improves social status (Lee, Detels, Rotheram-Borus, Duan, & Lord, 2007), but also impacts health outcomes, i.e. reduces HIV-related physical symptoms (Ashton, Vosvick, & Chesney, 2005). In addition, as noted earlier, the literature on PLWH has focused predominantly on the negative aspects of HIV/AIDS, so the knowledge about positive factors, including positive emotions among this patient group, is very scarce. In one of the few studies on this topic, Moskowitz’s (2003) seven-year longitudinal study found lower mortality among HIV-infected men with higher levels of positive affect. Similarly, Wilson et al. (2016), in a national study of HIV-infected women, observed that positive affect predicted viral suppression, which may also be understood that viral suppression can affect positive affect and generate a cycle of improvement for PLWH. Moreover, positive affect among PLWH was negatively related to the level of depression (Li, Mo, Wu, & Lau, 2016) and slower HIV progression...
and this effect was independent of negative affect. Employing Fredrickson’s (2001) broaden-and-build theory – in which positive emotions may enhance personal resources, well-being and psychological growth over time – Yu et al. (2014) claimed that positive affect should be treated as one of the most important predictors of PTG, especially in cases of life threatening diseases.

Finally, the results of this study demonstrate that, from the medical data, only HIV/AIDS status was negatively related to the level of PTG and the intensity of positive affect. Social support was related only to sociodemographic data, such as employment, higher education and a stable relationship, and not with medical data. This corresponds to other studies, which proved that an especially high threat of social rejection exists among PLWH, including deteriorating social status (Samson, Lavigne, & MacPherson, 2009). Notwithstanding, this finding may be interpreted in light of the great progress in HIV treatment, which resulted in HIV/AIDS being perceived as more of a chronic than a terminal condition; thus, psychosocial factors may be more important for well-being among PLWH compared to clinical variables (Deeks, Lewin, & Havlir, 2013). However, it should be noticed also that the study sample consists of highly functional PLWH with a CD4 level comparable to that of the general population (EACS, 2017), which may be the reason why almost all medical variables were not related to PTG among participants. Finally, HIV-infected women revealed higher levels of PTG, which correspond to studies conducted on the general population (Vishnevsky, Cann, Calhoun, Tedeschi, & Demakis, 2010) as well as among PLWH (Rzeszutek, Oniszczenko, & Firlag-Burkacka, 2016).

6. Strengths and limitations

This study has a few strengths, including that it is a longitudinal and theory-based study design with three assessments and that it investigates various dimensions of social support in relation to PTG. However, several limitations should also be noted. First, the final sample of the three assessments was relatively low due to high dropout. Second, for organizational reasons, the sample was heterogeneous in respect to the duration of HIV infection and, although this clinical variable was not significant in the path models, this fact ought to be reconsidered in discussing the findings of the study. Third, the PTGI questionnaire was used in this study, which measures retrospective reports of PTG. Some researchers have indicated that this is a method of assessment of growth rather than a reflect of real positive change, which may indicate some positive illusions (Frazier et al., 2009). In addition, HIV-related trauma is not a discrete traumatic event, i.e. PLWH may continue to feel traumatized by the diagnosis and healthcare regimens they are required to follow. Thus, there are authors who underlined that PTGI may not fully capture illness-related aspects of trauma and associated growth (Casellas-Grau, Ochoa, & Ruini, 2017). Finally, the PANAS-X questionnaire is not an appropriate tool for measurement emotion regulation strategies, and future research should focus on testing a similar model presented in this study while measuring emotion regulation strategies directly.

7. Conclusions

This study suggests the need for more research on positive aspects of HIV/AIDS, particularly PTG. Clinicians and researchers should further investigate the combined role of social support and positive affect in promoting positive change among PLWH. More specifically, complementary and integrative interventions, such as mindfulness, focused on enhancement and sustenance of positive affect among PLWH, should be an adjunct to traditional mental health screening among this patient group, especially that the effectiveness of such interventions for psychological health has been empirically proven (Moskowitz et al., 2017; Riley & Kalichman, 2015; Wilson et al., 2016).

Disclosure statement

No potential conflict of interest was reported by the author.

References

Adewuya, A., Afolabi, M., Ola, B., Ogundele, O., Ajibare, A., Oladipo, B., & Pakande, I. (2009). Post-traumatic stress disorder (PTSD) after stigma related events in HIV infected individuals in Nigeria. Social Psychiatry and Psychiatric Epidemiology, 44, 761–766. doi:10.1007/s00127-009-0493-7

Ashston, E., Vosvick, M., & Chesney, M. (2005). Social support and maladaptive coping as predictors of the change in physical health symptoms among persons living with HIV/AIDS. AIDS Patient Care and STDs, 19, 587–598. doi:10.1089/apc.2005.19.587

Boyraz, G., & Efstatiou, N. (2011). Self-focused attention, meaning, and posttraumatic growth: The mediating role of positive and negative affect for bereaved women. Journal of Loss and Trauma, 16, 13–32. doi:10.1080/15325024.2010.507658

Boyraz, G., Horne, S., & Sayger, T. (2010). Finding positive meaning after loss: The mediating role of reflection for bereaved individuals. Journal of Loss and Trauma, 15, 242–258. doi:10.1080/15325020903381683

Brzozowski, P. (2010). Skala Uczuć Pozytywnych i Negatywnych. Podręcznik [Positive and negative emotions scale: Manual]. Warszawa: Pracownia Testów Psychologicznych Polskiego Towarzystwa Psychologicznego.

Casellas-Grau, A., Ochoa, C., & Ruini, C. (2017). Psychological and clinical correlates of posttraumatic growth in cancer: A systematic and critical review. Psycho-Oncology. Advanced online publication. doi:10.1002/pon.4426
Chida, Y., & Vedhara, K. (2009). Adverse psychosocial factors predict poorer prognosis in HIV disease: A meta-analytic review of prospective investigations. *Brain, Behavior, and Immunity*, 23, 434–445. doi:10.1016/j.bbi.2009.01.013

Cieslak, R., Benight, B., Schmidt, N., Łuszczynska, A., Curtin, E., & Clark, A. (2009). Predicting posttraumatic growth among Hurricane Katrina survivors living with HIV: The role of self-efficacy, social support, and PTSD symptoms. *Anxiety, Stress, and Coping*, 22, 449–463. doi:10.1080/10615800802403815

Danoff-Burg, S., & Revenson, T. (2005). Benefit-finding among patients with rheumatoid arthritis: Positive effects on interpersonal relationships. *Journal of Behavioral Medicine*, 28, 91–103. doi:10.1007/s10865-005-2720-3

Deeks, S., Lewin, S., & Hivlar, D. (2013). The end of AIDS: HIV infection as a chronic disease. *Lancet*. Published online October 21, 2013. doi:10.1016/S0140-6736(13)61809-7

Dursun, P., Steger, M., Bentele, C., & Schulenberg, S. (2016). Meaning and posttraumatic growth among survivors of the September 2013 Colorado floods. *Journal of Clinical Psychology*, 72, 1247–1263. doi:10.1002/jclp.22344

European AIDS Clinical Society (EACS) guidelines. (2017 January). *Version 8.2*. Retrieved from http://www.eacsociety.org/guidelines/eacs-guidelines/eacs-guidelines.html

Fitzmaurice, G., Laird, N., & Ware, J. (2011). *Applied longitudinal analysis* (2nd ed.). Harvard: Wiley.

Frazier, P., Tennen, H., Gavian, M., Park, C., Tomich, P., & Tashiro, T. (2009). Does self-reported posttraumatic growth reflect genuine positive change? *Psychological Science*, 20, 912–919. doi:10.1111/j.1467-9280.2009.02381.x

Fredrickson, B. L. (2001). The role of positive emotions in positivepsychology. The broaden-and-build theory of positive emotions. *American Psychologist*, 56, 218–226. doi:10.1037/0003-066X.56.3.218

Gross, J., & John, O. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85, 348–362. doi:10.1037/0022-3514.85.2.348

Harosh, E., & Freedman, S. (2017). Posttraumatic growth and recovery from addiction. *European Journal of Psychotraumatology*. Advanced online publication. doi:10.1080/20008198.2017.1369832

Heffron, K., Grealy, M., & Mutrie, N. (2009). Post-traumatic growth and life threatening physical illness: A systematic review of the qualitative literature. *British Journal of Health Psychology*, 14, 343–378. doi:10.1348/135910708X332936

Helgeson, V., Reynolds, K., & Tomich, P. (2006). A meta-analytic review of benefit finding and growth. *Journal of Counseling and Clinical Psychology*, 74, 797–816. doi:10.1037/0022-066X.74.5.797

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, 6, 53–60. Retrieved from http://www.ejbrm.com/voice/v6/11/v6-11-papers.htm

IBM Corp. (Revised). (2016). *IBM SPSS statistics for windows*. Version 24, Armonk, NY: IBM Corp.

Ickovics, J., Milan, S., Boland, R., Schoenbaum, E., Schuman, P., & Vlahov, D. (2006). Psychological resources protect health: 5-year survival and immune function among HIV-infected women from four US cities. *AIDS*, 20, 1851–1860. doi:10.1097/01.aids.0000244204.95758.15

Isonson, G., & Hayward, H. (2008). Do positive psychosocial factors predict disease progression in HIV-1? A review of the evidence. *Psychosomatic Medicine*, 70, 546–554. doi:10.1097/PSY.0b013e318177216c

Jia, X., Ying, L., Zhou, X., Wu, X., & Chongde, L. (2015). The effects of extrasocial, social support on the posttraumatic stress disorder and posttraumatic growth of adolescent survivors of the Wenchuan earthquake. *PLoS One*. doi:10.1371/journal.pone.0121480

Kent, E., Alfano, C., Smith, A., Bernstein, L., McTiernan, A., Baumgartner, K., & Ballard-Barbash, R. (2013). The roles of support seeking and race/ethnicity in posttraumatic growth among breast cancer survivors. *Journal of Psychosocial Oncology*, 31, 393–412. doi:10.1080/07347332.2013.798759

Kline, R. (2015). *Principles and practice of structural equation modeling Fourth Edition*. New York: The Guilford Press.

Lee, S.-J., Detels, R., Rotheram-Borus, J. M., Duan, N., & Lord, L. (2007). Depression and social support among HIV-affected adolescents. *AIDS Patient Care STDS*, 21, 409–417. doi:10.1089/apc.2006.0066

Leserman, J. (2008). Role of depression, stress, and trauma in HIV disease progression. *Psychosomatic Medicine*, 70, 539–545. doi:10.1097/PSY.0b013e3181777a5

Li, J., Mo, P. K., Wu, A. M., & Lau, J. T. (2016). Roles of self-stigma, social support, and positive and negative affects as determinants of depressive symptoms among HIV infected men who have sex with men in China. *AIDS and Behavior*, 21, 261–273. doi:10.1007/s10461-016-1321-1

Linley, P., & Joseph, S. (2004). Positive change following trauma and adversity: A review. *Journal of Traumatic Stress*, 17, 11–21. doi:10.1023/B:JOTS.0000014671.27856.7e

Łuszczynska, A., Kowalska, M., Mazurkiewicz, M., & Schwarzer, R. (2006). Berlinische Skale Wsparcia Społecznego (BSSS). Wyniki wstępnych badan nad rzetelnością i trafośnością [Berlin Social Support Scales (BSSS). Preliminary results on the reliability and validity]. *Studia Psychologiczne*, 44, 17–27.

Łuszczynska, A., Sarkar, Y., & Knoll, N. (2007). Received social support, self-efficacy, and finding benefits in disease as predictors of physical functioning and adherence to antiretroviral therapy. *Patient Education and Counseling*, 66, 37–42. doi:10.1016/j.jpec.2006.10.002

Machtinger, E., Wilson, T., Haberer, J., & Weiss, D. (2012). Psychological trauma and PTSD in HIV-positive women: A meta-analysis. *AIDS and Behavior*, 16, 2091–2100. doi:10.1007/s10461-011-0127-4

Maercker, A., & Zoellner, T. (2004). The janus face of self-perceived growth: Toward a two-component model of posttraumatic growth. *Psychological Inquiry*, 15, 41–48. Retrieved from http://www.jstor.org/stable/20447200

Martin, L., & Kagee, A. (2011). Lifetime and HIV-related PTSD among persons recently diagnosed with HIV. *AIDS and Behavior*, 15, 125–131. doi:10.1007/s10461-008-9498-6

Milam, J. E. (2004). Posttraumatic growth among HIV/AIDS patients. *Journal of Applied and Social Psychology*, 34, 2353–2376. doi:10.1111/j.1559-1816.2004.tb01981.x

Milam, J. E. (2006). Posttraumatic growth and HIV disease progression. *Journal of Consulting and Clinical Psychology*, 74, 817–827. doi:10.1037/0022-006X.74.5.817

Moskowitz, J., Carrico, A., Duncan, L., Cohn, M., Cheung, E., & Batchelder, A. (2017). Randomized controlled trial of a positive affect intervention for people newly
diagnosed with HIV. *Journal of Consulting and Clinical Psychology*, 85, 409–423. doi:10.1037/cclp0000188

Moskowitz, J. T. (2003). Positive affect predicts lower risk scores of AIDS mortality. *Psychosomatic Medicine, 65*, 620–626. doi:10.1097/01.PSY.0000073873.74829.23

Murphy, P., & Hevey, D. (2013). The relationship between internalised HIV-related stigma and posttraumatic growth. *AIDS and Behavior, 17*, 1809–1818. doi:10.1007/s10461-013-0482-4

Ogińska-Bulik, N., & Juczyński, Z. (2010). Rozwój potraumacyjny - charakterystyka i pomiar [Posttraumatic growth: Characteristics and measurement]. *Psychiatria*, 7, 129–142.

Olley, B., Zeier, M., Seedat, S., & Stein, D. (2005). Posttraumatic stress disorder among recently diagnosed patients with HIV/AIDS in South Africa. *AIDS Care*, 17, 550–557. doi:10.1080/0954012042331319741

Páez, D., Basabe, N., Ubillos, S., & González, J. L. (2007). Social sharing, participations in demonstrations, emotional climate and coping with collective violence after March 11th Madrid bombings. *Journal of Social Issues*, 63, 323–337. doi:10.1111/j.1540-4560.2007.00511.x

Park, C., & Helgeson, V. (2006). Introduction to the special section: Growth following highly stressful life events: current status and future directions. *Journal of Consulting and Clinical Psychology*, 74, 791–796. doi:10.1037/0022-006X.74.5.791

Prati, G., & Pietrantoni, L. (2009). Optimism, social support, and coping strategies as factors contributing to posttraumatic growth: A meta-analysis. *Journal of Loss and Trauma, 14*, 364–368. doi:10.1080/15568580902724271

Rabe, S., Zöllner, T., Maercker, A., & Karl, A. (2006). Neural correlates of posttraumatic growth after severe motor vehicle accidents. *Journal of Consulting and Clinical Psychology*, 74, 880–886. doi:10.1037/0022-006X.74.5.880

Riley, K., & Kalichman, S. (2015). Mindfulness-based stress reduction for people living with HIV/AIDS: Preliminary review of intervention trial methodologies and findings. *Health Psychology Review*, 9, 224–243. doi:10.1080/17437199.2014.895928

Rzeszutek, M., Oniszczenko, W., & Firlag-Burkacka, E. (2016). Gender differences in posttraumatic stress symptoms and the level of posttraumatic growth among a Polish sample of HIV-positive individuals. *AIDS Care: Psychological, and Socio-Medical Aspects of AIDS/HIV, 28*, 1411–1415. doi:10.1080/09540121.2016.1182615

Rzeszutek, M., Oniszczenko, W., & Firlag-Burkacka, E. (2017). Social support, stress coping strategies, resilience and posttraumatic growth in a Polish sample of HIV+ individuals: Results of a one year longitudinal study. *Journal of Behavioral Medicine*. Advanced online publication. doi:10.1007/s10865-017-9861-z

Rzeszutek, M., Oniszczenko, W., Żebrowska, M., & Firlag-Burkacka, E. (2015). HIV infection duration, social support and the level of trauma symptoms in a sample of HIV-positive Polish individuals. *AIDS Care, 27*, 363–369. doi:10.1080/09540121.2014.963018

Samson, A., Lavigne, R., & MacPherson, P. (2009). Self-fulfillment despite barriers: Volunteer work of people living with HIV. *AIDS Care, 21*, 1425–1431. doi:10.1080/09540120902814403

Sawyer, A., Ayers, S., & Field, A. P. (2010). Posttraumatic growth and adjustment among individuals with cancer and HIV/AIDS: A meta-analysis. *Clinical Psychology Review, 30*, 436–447. doi:10.1016/j.cpr.2010.02.004

Schroers, M., Helgeson, V., Sanderman, R., & Ranchor, A. (2010). Type of social support matters for prediction of posttraumatic growth among cancer survivors. *Psycho-Oncology, 19*, 46–53. doi:10.1002/pon.1501

Schulz, U., & Schwarzer, R. (2003). Soziale Unterstützung bei der Krankheitsbewältigung: Die Berliner Social Support Skalen (BSSS). *Diagnostica, 49*, 73–82. doi:10.1026/0012-1924.49.2.73

Sears, S. R., Stanton, L., & Danoff-Burg, S. (2003). The yellow brick road and the emerald city: Benefit finding, positive reappraisal coping, and posttraumatic growth in women with early-stage breast cancer. *Health Psychology, 22*, 487–497. doi:10.1037/0278-6133.22.5.487

Sheikh, A. (2004). Posttraumatic growth in the context of heart disease. *Journal of Clinical Psychology in Medical Settings, 11*, 265–273. doi:10.1023/B:JOCS.0000045346.76242.73

Sherr, L., Nagra, N., Kulubya, G., Catalan, J., Clucasa, C., & Harding, R. (2011). HIV infection associated post-traumatic stress disorder and post-traumatic growth – A systematic review. *Psychology, Health & Medicine, 16*, 612–629. doi:10.1080/13548506.2011.579991

Siegel, K., & Schrimshaw, E. (2000). Perceiving benefits in adversity: Stress-related growth in women living with HIV/AIDS. *Social Science & Medicine, 51*, 1543–1554. doi:10.1016/S0277-9536(00)00144-1

Siegel, K., Schrimshaw, E., & Pretter, S. (2005). Stress-related growth among women living with HIV/AIDS: Examination of an explanatory model. *Journal of Behavioral Medicine, 28*, 403–414. doi:10.1007/S10865-005-9015-6

Tedesch, R., & Calhoun, L. (1996). The posttraumatic growth inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress, 9*, 455–471. doi:10.1002/JTS.2490090305

Tedesci, R., & Calhoun, L. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15*, 1–18. doi:10.1207/S15329765PLI150101

Tennenh, H., & Affleck, G. (2002). Benefit-finding and ben-efitreminding. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 584–597). New York, NY: Oxford University Press.
Theuninck, A., Lake, N., & Gibson, S. (2010). HIV-related posttraumatic stress disorder: Investigating the traumatic events. *AIDS Patient Care and STDs, 24*, 458–491. doi:10.1089/apc.2009.0231

Vishnevsky, T., Cann, A., Calhoun, L., Tedeschi, R., & Demakis, J. (2010). Gender differences in self-reported posttraumatic growth: A meta-analysis. *Psychology of Women Quarterly, 34*, 110–120. doi:10.1111/j.1471-6402.2009.01546.x

Watson, D., Clark, L., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect. The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063–1070.

Wilson, T., Weedon, J., Cohen, M., Golub, E., Milam, J., Young, M., & Fredrickson, B. L. (2016). Positive affect and its association with viral control among women with HIV infection. *Health Psychology, 36*, 91–100. doi:10.1037/hea0000382

Yu, Y., Peng, L., Tang, T., Chen, L., Li, M., & Wang, T. (2014). Effects of emotion regulation and general self-efficacy on posttraumatic growth in Chinese cancer survivors: Assessing the mediating effect of positive affect. *Psycho-Oncology, 23*, 473–478. doi:10.1002/pon.3434