Stress-Related Growth Following Sport Injury: Examining the Applicability of the Organismic Valuing Theory

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Abstract

This study explored the applicability of Organismic Valuing Theory (OVT; Joseph & Linley, 2005) to stress-related growth (SRG) following sport injury. Specifically, the direct and indirect relationships between need satisfaction (i.e., autonomy, competence, and relatedness), SRG, and subjective well-being (i.e., positive affect) were examined. Previously injured athletes (N=520), ranging from 18 to 59 years of age (M_{age} = 23.3 years; SD = 6.5), completed three measures: Needs Satisfaction Scale, Stress-Related Growth Scale, and Positive Affect Scale. Structural equation modeling with maximum likelihood estimation revealed a significant positive relationship between competence and relatedness and SRG, and between SRG and positive affect. In line with OVT, SRG was also found to mediate the relationship between need satisfaction (competence and relatedness) and subjective well-being. The findings offer preliminary support for the applicability of OVT in aiding our understanding of the antecedents and consequences of SRG. Future avenues of research are discussed, together with recommended methodologies to further extend and refine knowledge and understanding of the phenomenon of SRG following sport injury.

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Keywords: adversity, well-being, autonomy, competence, relatedness

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In recent years, researchers have turned their attention towards understanding positive environments, traits, and subjective experiences in the context of sport injury (e.g., Smith & Sparkes, 2005; Niven, 2007; Tracey, 2011; Lu & Hsu, 2013; Mel & Wadey, 2015). This shift in the literature from the dominant focus on the negative consequences of injury has helped provide a greater understanding of athletes' recovery from injury. One subjective experience that has gained a lot of interest is stress-related growth (SRG). Park et al. (1996) defined SRG as positive changes to an individual following a stressful event resulting in them operating at a higher level of functioning. For example, Udry et al. (1997) interviewed U.S. elite skiers who had sustained season-ending injuries. The positive changes reported were personal (e.g., gaining a sense of perspective), psychological (e.g., increased mental toughness), physical (e.g., improved fitness), and technical (e.g., ski technically better). Subsequent studies have supported these findings and shown male and female athletes, from team and individual sports, across various levels of competition, and with different types of injuries to report SRG (e.g., Bianco et al., 1999; Hurley et al., 2007; Tracey, 2011; Podlog et al., 2013). With the knowledge that injured athletes can experience SRG, researchers are now recommending that we enhance our understanding of its antecedents and consequences (Galli & Reel, 2012; Tamminen et al., 2013; Salim et al., 2015). The challenge with this future research direction is that there is not a contextually-sensitive theory to guide research interested in the psychology of sport injury; therefore, Wadey et al. (2011) recommended examining the applicability of formal theories of SRG.

One of the most comprehensive explanations of growth following adversity is Joseph and Linley's (2005) organismic valuing theory of growth through adversity (OVT). In OVT, it is posited that encountering a stressful event (e.g., injury) can shatter a person's assumptive

world. When this shattering effect occurs, the theory suggests that there is a need to integrate the new stress-related information (i.e., completion tendency). The adjustment required for integration involves an individual going through a series of oscillating phases of intrusion and avoidance as this new information is processed in one of two ways. Either this information is *assimilated* within existing models of the world (i.e., appraise and accept that the new trauma information is *congruent* with pre-existing beliefs), or existing models of the world are modified to *accommodate* this information (i.e., appraise and accept that the new trauma information is *incongruent* with pre-existing beliefs). Accommodation requires people to change their worldview in either a negative (e.g., the world is unsafe) or positive direction (e.g., life is to be lived to the full). The theory holds that individuals have an innate tendency to modify existing models of the world to positively accommodate new trauma-related information. This innate tendency is the organismic valuing process. An individual acting concordantly with his or her organismic valuing process is however challenging, and requires a supportive social environment that facilitates satisfaction of the basic human needs of autonomy, competence, and relatedness (prior to and post-trauma). Of particular interest to this study and drawing upon self-determination theory (SDT; Ryan & Deci, 2000), OVT suggests that if the environment is not supportive of these needs, the organismic valuing process will be thwarted. The theory suggests that there are three cognitive-outcomes: (a) assimilation, leading to a pre-trauma baseline; (b) negative accommodation, leading to distress; and (c) positive accommodation, that is, SRG. To move beyond pre-stress baseline requires accommodation as opposed to assimilation, given that SRG is by definition about new world views. Finally, Joseph and Linley hypothesized that, over time, SRG will lead to greater subjective well-being (e.g., increased positive affect).

Although the application of OVT in the context of sport injury has yet to be explored, previous researchers have drawn upon SDT to examine the effect of basic psychological need

satisfaction on injured athletes' rehabilitation responses and return-to-sport outcomes (for a review, see Podlog et al., 2011). Podlog and Eklund reported that SDT offers promise in the explanation of the return-to-sport process following injury. SDT focuses specifically on the effects of varying degrees of self-determination on human behavior, health and well-being. Ryan and Deci (2000) proposed that to be self-determined, individuals' basic needs of competence, autonomy and relatedness require fulfilment. Competence is characterized by a sense of proficiency or effectiveness in the things one engages in. Autonomy is characterized by an internal locus of control and the perception that behaviours are self-authored or personally endorsed. The construct of relatedness refers to a sense of connectedness or belonging in the social world. When the environment satisfies these three basic needs, individuals are more likely to experience enhanced personal well-being (Ryan & Deci, 2000). Recently, Podlog et al. (2010) confirmed this hypothesis by observing that need satisfaction was positively correlated with subjective well-being indicators (e.g., positive affect) and negatively associated with negative affect in a sample of injured athletes' returning-to-sport following injury. Therefore, although OVT suggests that subjective well-being is fostered indirectly through SRG, it is also interesting to note that SDT suggests well-being can be directly influenced by an environment that facilitates injured athletes' needs of autonomy, competence, and relatedness.

In sum, researchers have found injured athletes to report experiences of SRG; however, little is known about its antecedents and consequences of this potentially desirable process-orientated recovery outcome. The line of research is important for at least two reasons: (a) identifying the antecedents of SRG will help to inform professional practice; and (b) uncovering the consequences of SRG will help to understand what, if any, impact SRG has on important health- and performance-related outcomes (e.g., re-injury rates, sporting performance, subjective well-being). Aligned with this future research direction, it has been

recommended that future researchers examine the applicability of formal theories of SRG in the context of sport injury. Informed by OVT and SDT tenets, the purpose of this study was to explore the relationship between need satisfaction (i.e., autonomy, competence, and relatedness), SRG and subjective well-being among injured athletes. It was hypothesized that: (1) need satisfaction would be positively associated with SRG; (2) need satisfaction would be positively associated with subjective well-being (i.e., heightened positive affect); (3) SRG would be positively associated with subjective well-being; and (4) SRG would mediate the relationship between needs satisfaction and positive affect.

Method

Participant

Participants were recruited if they were: (a) 18 years of age or older; (b) had incurred a sports-related injury (i.e., during training or competition); (c) experienced an injury requiring a minimum four-week absence from practice and competition, and had returned to competitive sport following their rehabilitation; and (d) had experienced their injury within the past two years. The final sample comprised 520 male (n = 316) and female (n = 204) athletes from the United Kingdom and United States, ranging from 18 to 59 years of age (M_{age} = 23.3; SD = 6.5). Participants competed at various levels (i.e., NCAA Division I-III, state, national, international), and had been competing in their respective sport for an average of 12 years (SD = 6.8). A total of 39 sports were represented in the sample including: soccer (n = 78), basketball (n = 64), American football (n = 47), rugby union (n = 34), running (n = 27), and volleyball (n = 26). The mean length of time that participants were unable to train and/or compete as a consequence of their injury was 106 days (SD = 117.7).

Instruments

Need Satisfaction Scale (NSS). The NSS (Podlog et al., 2010) was used to assess participants' need satisfaction. NSS is an eight-item questionnaire designed to assess the

extent to which injured athletes felt their needs for autonomy (e.g., "*My physiotherapist provided me with choices and options during rehabilitation sessions*"), competence (e.g., "*I was good at performing my rehabilitation exercises*"), and relatedness (e.g., "*My coaches encouraged and supported me during my injury recovery*") were satisfied over the course of their rehabilitation. Participants were asked to respond to each item on a five-point Likert scale with anchors ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Podlog et al.'s (2010) analyses revealed support for the three-factor model and internal consistency. Cronbach's alpha coefficients in the present study were .86 for autonomy, .87 for competence, and .92 for relatedness, which is deemed as adequate (i.e., not below .80; Lance, Butts, & Michels, 2006).

Stress-Related Growth Scale (SRGS). The SRGS (Park et al., 1996) was used to assess perceived SRG. SRGS is a 50-item one-dimensional questionnaire designed to assess individuals' perceptions of whether they experience positive outcomes following a stressful event (e.g., "*I developed new relationships with helpful others*" and "*I learned that I was stronger than I thought I was*"). To ascertain athletes' perceptions of stress-related growth, the original stem was modified from "*Rate how much you experienced each item below as a result of this year's most stressful event*" to "*Rate how much you experienced each item below as a result of your injury*". Participants were asked to rate each item from 0 (*not at all*), 1 (*somewhat*) or 2 (*a great deal*). Psychometric analyses showed the SRGS to have satisfactory internal consistency and model fit (Park et al., 1996). A Cronbach's alpha of .97 was found in the current study.

Positive and Negative Affect Scale (PANAS). The PANAS (Watson et al., 1988) was used to assess subjective well-being. PANAS is a 20-item measure of positive affect (PA) and negative affect (NA). PA reflects participants' degree of enthusiasm, alertness, and pleasurable engagement. NA reflects distress and unpleasurable engagement and includes

mood states such as anger, contempt, guilt, and fear. Participants rated a number of words that described feelings and emotions according to how they felt following their return to competitive sport. Participants were asked to respond to each item on a five-point Likert scale with anchors ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Researchers have observed the PANAS to demonstrate factorial validity, as well acceptable Cronbach's alphas and test-retest reliabilities across different temporal instructions (Crawford & Henry, 2004; Watson et al., 1988). Cronbach's alpha coefficients of .88 for PA and .85 for NA were found in this study.

Procedure

After approval of the study from the institutional human-research ethics committee, participants in the current investigation were given an informed consent form, information sheet outlining the study purposes, and details of their involvement. Participants were also given a verbal account of the study purposes and were provided with a standardized set of instructions regarding questionnaire completion based upon the recommendations of Podlog et al. (2010), Park et al. (1996), and Watson et al. (1988). Questionnaires were administered by trained research assistants at sports facilities, team meetings, practice sessions, and competition venues, and took approximately 20-25 minutes to complete. Completed questionnaires were placed in a sealed envelope and returned to the authors for data entry.

Data Analysis

Preliminary analyses, including inspection of frequencies, descriptive statistics, and correlations were conducted with SPSS Version 22. First, missing data was addressed, and the Expected-maximization algorithm was employed to replace missing values in the data set with maximum likelihood estimates (Schafer, 1997). AMOS version 20 (Arbuckle, 2011) was used to conduct structural equation modeling (SEM) with maximum likelihood estimation, which allowed for an examination of the hypothesized direct and indirect

relationships between needs satisfaction, SRG, and subjective well-being (i.e., positive affect). Second, the 50 items on this scale were randomly assigned into three composite parcels. Parceling alleviates various psychometric and modeling difficulties that come from attempting to analyze latent constructs with large numbers of items (Matsunaga, 2008), and has been suggested to be effective when dealing with a unidimensional latent construct such as SRG. Furthermore, parcelling is appropriate when understanding the nature of the relationship between latent constructs is the primary goal (Little et al., 2002). As recommended by Matsunaga (2008), items were randomly parcelled into three groups. Each item was assigned a random number using Microsoft Excel, and then sorted from the smallest to the largest assigned random number. The first 17 items formed parcel 1, the second 17 items formed parcel 2, and the final 16 items formed parcel 3. Each parcel exhibited strong internal consistency (alphas ranged from .90 to .92).

Next, the assumptions of univariate and multivariate normality were tested. Results of the Shapiro-Wilk test revealed that the assumption of univariate normality was violated for SRG and positive affect ($p < .001$). Further, skewness and kurtosis critical ratios for most observed variables exceeded the acceptable threshold of > -2 < +2 (Cameron, 2004), and the critical ratio of Mardia's coefficient exceeded 1.96 (*c. r.* = 23.64), indicating a lack of multivariate normality (Gao et al., 2008). Examination of Mahalanobis distances revealed several multivariate outliers that potentially contributed to the problems with normality. Because indices of model fit were virtually identical when the model was tested both with and without the outliers, the outlying cases were retained. However, due to the potential for biased results with nonnormal data, a bootstrapping procedure (Efron, 1979) using 2,000 samples was performed to confirm the stability of the parameter estimates (Table 4). Efron and Tibshirani (1993) suggest that bootstrap samples of 1,000 or more generally lead to

accurate results. This same bootstrapping procedure was used to assess the indirect effects of need satisfaction on subjective well-being (Preacher & Hayes, 2004).

Upon conducting the analysis, goodness-of-fit of the proposed model to the data was assessed using a combination of fit indices: maximum likelihood chi-square (χ^2), the comparative fit index (CFI), the root mean squared error of approximation (RMSEA), and the standardized root-mean squared residual (SRMR). Although failure to reject the null hypothesis is one indicator of acceptable model fit, it is sensitive to sample size, and is nearly always rejected with large samples (Jöreskog, 1993). Other indicators of acceptable fit are $\geq$ .90 for the CFI, $\leq$ .08 for the RMSEA, and $\leq$ .09 for the SRMR (Hair et al., 2010).

Results

Descriptive Statistics and Bivariate Correlations

Bivariate correlations for all variables were conducted, as well as means and standard deviations (Table 1). Mean scores indicated that participants experienced moderate-to-high levels of need satisfaction over the course of their rehabilitation, which is consistent with the findings of Podlog et al. (2010). Small-to-moderate positive correlations were found between the NSS subscales. Each NSS subscale was positively related to SRG and positive affect. With regard to SRG, the mean score of 48.90 was consistent with the findings from Park et al. (1996) that reported a mean score of 50.68 for their sample of 506 college students who reported experiencing a diverse range of stressful events. SRG demonstrated small-to-moderate positive correlations with all study variables. Finally, mean values for positive (M = 36.23) were higher than those reported in previous research on general adult population norms (Crawford & Henry, 2004).

Structural Equation Model

Goodness-of-fit indicated that our model was a reasonably good fit to the data (χ^2 = 879.62, p < .001; CFI = .91; RMSEA = .09, 90% [.08, .09]; SRMR = .05). As shown in

Figure 1, the direct paths from competence and relatedness to SRG and positive affect were significant (p = .001), as well as the direct path from SRG to positive affect (p = .001). The bootstrapping procedure described by Preacher and Hayes (2004) was used to establish the presence of mediation. Upon inspection of the standardized indirect effects, there were small indirect effects of competence (β = .06; p < .01; 95% [.03, .09]) and relatedness (β = .04; p < .01; 95% [.01, .07]) on positive affect (Table 3). However, neither the direct path from autonomy to SRG, nor the indirect path from autonomy to positive affect, was significant (p > .10). The need satisfaction variables explained 13.4% of the variance in SRG, and need satisfaction along with SRG explained 38.4% of the variance in positive affect. Table 4 shows a comparison of the standard error (SE) of the mean bootstrap from all 2,000 samples to the SE of the difference between the SE of the original sample and mean bootstrap samples (i.e., SE-bias). In all cases, the SE-bias was smaller than the SE mean of the bootstrap sample, indicating unbiased results despite the lack of normality (Ievers-Landis et al., 2011).

Discussion

This is the first theoretically-based examination of the factors leading to SRG in a sport injury context. Moreover, until now, limited understanding of the potential consequences of SRG following injury existed (e.g., positive affect). This study, therefore, contributes to theory and practice by examining the means through which injured athletes may achieve SRG and subjective well-being. Consistent with hypothesis one, positive correlations were found between the need satisfaction variables and SRG. This finding not only aligns with previous studies that illustrate a relationship between need satisfaction and positive injury outcomes (Podlog & Eklund, 2009), but also supports one of the central tenets of OVT. Indeed, findings demonstrate the rehabilitation environment must fulfil athletes' needs for competence, autonomy, and relatedness to encourage SRG (Joseph & Linley, 2005). Although not suggested in OVT, our second hypothesis was based on SDT. As predicted,

findings demonstrated a direct positive relationship between competence and relatedness and positive affect. SDT suggests that need satisfying environments lead to well-being indicators because the fulfilment of basic needs helps imbue individuals' with the fundamental nourishments required to thrive in the world, to experience optimal social functioning, and to experience a greater preponderance of positive versus negative emotions (Ryan & Deci, 2000). Future research should seek to explore further how OVT and SDT, and other potential theories, can be integrated to aid our understanding of the sport injury experience.

Our third hypothesis was that SRG would be positively associated with an indicator of subjective well-being. In support of this contention, we found a moderate positive correlation between SRG and positive affect. This finding is consistent with several studies that have found growth to be associated with subjective well-being – that is, higher positive affect (e.g., Park et al., 1996; Abraido-Lanza et al., 1998; Evers et al., 2001; Durkin & Joseph, 2009). To better understand the relationship between growth and positive affect as well as other aspects of subjective well-being (e.g., life satisfaction) however, researchers should aim to conduct longitudinal investigations of these relationships. This approach will enable researchers to better understand the dynamic nature of this relationship. According to the tenets of Joseph and Linley's (2005) OVT theory, it is only with time that higher levels of SRG will lead to higher levels of subjective well-being. How much time it takes and the circumstances surrounding this change is an interesting, and worthy line of future research to better understand how to enhance the long-term well-being of athletes.

Our final hypothesis suggested SRG would mediate the need satisfaction/well-being relationship. As predicted and consistent with OVT, the effect of competence and relatedness on positive affect was mediated by SRG. According to OVT, for SRG to occur individuals must positively accommodate the stressful event into their schemas of the world; however, this accommodation process is rife with challenge and requires an environment supportive

(Joseph & Linley, 2005). This finding is consistent with research in other contexts, and with different conditions, that have found social support to contribute to SRG (e.g., Burke & Sabiston, 2010; McDonough et al., 2011; McDonough et al., 2014). In contrast with our mediation hypothesis however, SRG did not mediate the relationship between autonomy and positive affect. One explanation might be the nature of the autonomy items. Items asked athletes to identify the extent to which their physiotherapists provided choices and options, which might be less important in the development of SRG than the perception that one is volitional in making the initial decision to undertake rehabilitation. Podlog et al. (2010) previously argued that injured athletes may be content to relinquish a certain amount of autonomy regarding their injury rehabilitation. That is, once athletes autonomously decide to make a recovery from injury, they may be less inclined to make decisions (i.e., exert decisional autonomy) about their treatment protocol given a potential lack of expertise on injury rehabilitation. Further need satisfaction scale development is required to ensure that autonomy items capture the full breadth of the concept as it pertains to injury rehabilitation.

Practical Implications, Limitations, and Future Research

From a practical standpoint, and consistent with the tenets of OVT (Joseph & Linley, 2005), these findings suggest that SRG may be subject to environmental influences that enhance (or undermine) its development. Practitioners working with injured athletes in hospitals, clinics, and sporting venues should consider how the infrastructure in their environment, the climates they operate in, and the relationships they build with athletes help to foster athletes' basic psychological needs and encourage SRG. This approach aligns with Sheikh (2008) recommendation that strategies to encourage SRG should be conducted indirectly by creating a facilitative environment; as directly encouraging growth may backfire, as it may result in feelings of inadequacy and shame if an individual cannot find something good in what has happened to them (Wortman, 2004). To-date, previous

researchers have demonstrated preliminary support for using a range of competence (e.g., goal setting, imagery) and relatedness (e.g., social support, role models) strategies in the service of injury rehabilitation (Evans & Hardy, 2002; Heil & Podlog, 2012). However, we still do not fully understand the importance and significance of the practitioner-client relationship surrounding the use of these strategies. Indeed, Calhoun and Tedeschi (1999) noted that practitioners cannot create SRG for their clients; they can only facilitate the client's effort to achieve SRG. How practitioners build relationships and facilitate client's efforts is a worthy future area of research. To get to the very heart of the practitioner-client relationship and to better understand the social environments where these relationships form and evolve future researchers are encouraged to use qualitative research (e.g., ethnography, case studies). From expanding our understanding of environments and relationships and how these affect how athletes' think, feel, and transact with their environments, we will be in a better position to develop innovative ways to enhance athletes' well-being.

Despite advancing an understanding of SRG antecedents and consequences among injured athletes, several limitations in the present investigation are apparent. First, the cross-sectional design of the present study mitigates cause and effect conclusions. Longitudinal research examining the dynamic relationship between need-satisfaction and SRG is therefore warranted. For example, researchers could assess need satisfaction prior to injury occurrence, during rehabilitation, and upon subsequent return to competitive sport to provide a better understanding of its relationship with SRG. Second, while need satisfaction variables articulated in OVT may be important predictors of SRG, given the relatively small correlations between need satisfaction variables and SRG, it is apparent that other components of OVT warrant further consideration. Future researchers should aim to examine the processes of accommodation and assimilation, and whether athletes do have an innate tendency for positive accommodation. In addition, in this study, we only examined one

subjective well-being outcome of SRG, namely, positive affect. The relationship between SRG and other indicators of subjective well-being should be examined (e.g., vitality, self-confidence, self-esteem, negative affect, and life satisfaction). Finally, the regression coefficients for competence, relatedness, SRG and positive affect observed in the SEM model were relatively low. Although such coefficients are consistent with past research (e.g., Podlog et al., 2010), several reasons may account for these: (a) the lack of available sport-specific measures for assessing constructs of interest (e.g., SRG following sport injury) and (b) the non-context specific nature of OVT (i.e., there may be idiosyncratic differences for injury as a stressor). Despite these limitations, the present study highlights the existence of important relationships between need satisfaction variables, SRG and athlete well-being following severe injury.

Brief Perspective Paragraph

Putting the findings into perspective: Overall, this is the first study to explore the antecedents and consequences of stress-related growth (SRG) following sport injury (i.e., a positive process-orientated recovery outcome). This line of research is important for two reasons: First, from exploring the antecedents of SRG, researchers can identify how to enable athletes to experience this recovery outcome. Findings suggest that creating an environment that fosters individuals' psychological needs of competence and relatedness will lead to SRG. Second, from identifying the consequences of SRG, researchers can understand what, if any, impact this recovery outcome has on important health- and performance-related outcomes. The findings from this study suggest that SRG is associated with improved subjective well-being (i.e., positive affect).

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Potential impact:

The direct impact of the present findings is that they increase our understanding of how to enhance injured athletes' psychological and subjective well-being. The indirect impact of the present findings is that it may lead to future programmes of research that have economic implications for the health care system. Carver (1998) reported:

> Some individuals are even stronger after their traumatic event than before. These people cost the [health] care even less, by being less prone to relapse, maybe even less vulnerable to new adversities. If we can understand why some people [experience growth], and if we can teach the skill to others, the benefits to the nation's health care system could potentially be enormous (p. 263).

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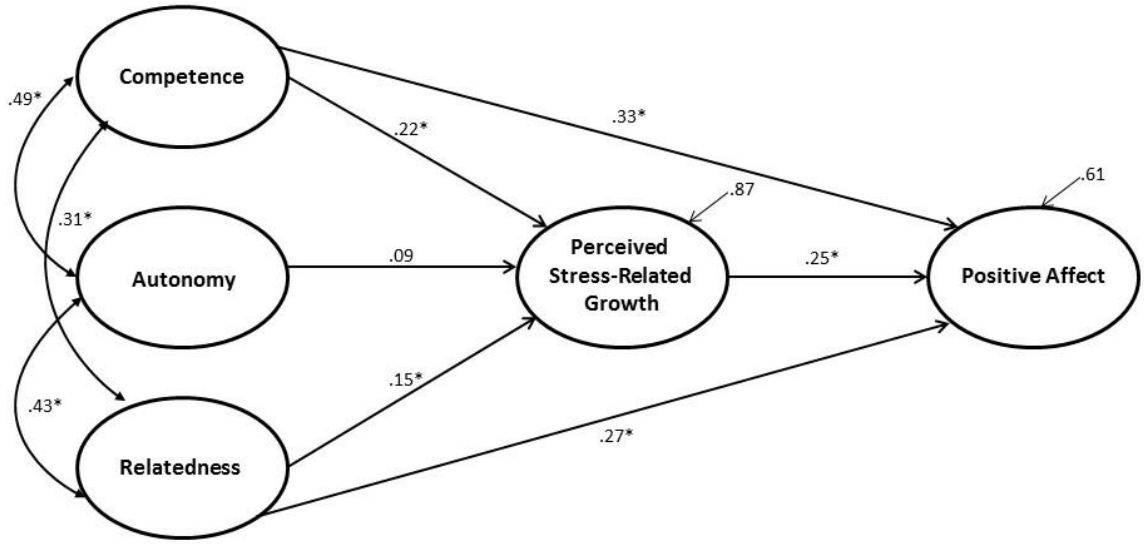
2

Figure Captions

Figure 1. Structural equation model to test the direct and indirect effects of needs satisfaction and stress-related growth on positive affect.



Note. Ovals indicate latent variables. Straight arrows represent regressions. Straight arrows leading to dependent variables represent residual variance (error) estimates. Double arrows represent correlations. Parameter estimates are standardized regression coefficients.

*$p < .01$.

Table 1

Means, Range, Standard Deviations, and Pearson Product-Moment Correlations for Need Satisfaction, Stress-Related Growth, and Subjective Well-Being (N = 520).

Variable	1	2	3	4	5	*M*	*Range*	*SD*
1. Competence	___					8.01	2 - 10	1.72
2. Autonomy	.44**	___				11.32	3 - 15	2.88
3. Relatedness	.27**	.39**	___			10.96	3 - 15	3.19
4. SRG	.29**	.24**	.25**	___		48.90	0 - 100	24.06
5. +ve Affect	.43**	.32**	.39**	.41**	___	36.23	10 - 50	7.43

** $p < .01$.

Table 2

Unstandardized and Standardized Parameter Estimates for the Measurement Model (N = 520)

Parameter Estimate	*Unstandardized (Standard Error)*	*Standardized*	*p*
NSS			
Competence → NSS7	1.15 (.07)	.91	< .001
Competence → NSS8	1.00	.84	NA
Autonomy → NSS4	.97 (.05)	.83	< .001
Autonomy → NSS5	1.00	.84	NA
Autonomy → NSS6	.98 (.03)	.85	< .001
Relatedness → NSS1	.95 (.03)	.85	< .001
Relatedness → NSS2	1.01 (.03)	.92	< .001
Relatedness → NSS3	1.00	.93	NA
NSS1 Error	.38 (.03)	.28	< .001
NSS2 Error	.21 (.02)	.16	< .001
NSS3 Error	.18 (.02)	.14	< .001
NSS4 Error	.36 (.03)	.31	< .001
NSS5 Error	.33 (.03)	.29	< .001
NSS6 Error	.45 (.04)	.37	< .001
NSS7 Error	.14 (.04)	.16	< .001
NSS8 Error	.23 (.03)	.29	< .001
Competence ↔ Autonomy	.33 (.04)	.50	< .001
Competence ↔ Relatedness	.24 (.04)	.31	< .001
Autonomy ↔ Relatedness	.40 (.05)	.43	< .001
SRGS			
SRG → Parcel 1	1.00	.98	NA
SRG → Parcel 2	.94	.97	< .001
SRG → Parcel 3	.94	.95	< .001
Parcel 1 Error	3.27 (.42)	.04	< .001
Parcel 2 Error	4.00 (.41)	.06	< .001
Parcel 3 Error	6.41 (.52)	.09	< .001
PANAS (Positive Affect)			
Determined → Positive Affect	1.00	.71	NA
Active → Positive Affect	1.14 (.08)	.70	< .001
Strong → Positive Affect	1.09 (.08)	.64	< .001
Enthusiastic → Positive Affect	1.25 (.08)	.78	< .001
Alert → Positive Affect	.78 (.07)	.49	< .001
Excited → Positive Affect	1.34 (.08)	.74	< .001
Proud → Positive Affect	1.18 (.09)	.63	< .001
Interested → Positive Affect	1.03 (.08)	.62	< .001
Attentive → Positive Affect	1.03 (.08)	.61	< .001
Inspired → Positive Affect	1.20 (.08)	.68	< .001
Determined Error	.39 (.03)	.50	< .001
Active Error	.54 (.04)	.51	< .001
Strong Error	.70 (.05)	.60	< .001
Enthusiastic Error	.42 (.03)	.40	< .001
Alert Error	.74 (.05)	.76	< .001
Excited Error	.60 (.04)	.45	< .001

Proud Error	.85 (.06)	.60	< .001
Interested Error	.69 (.05)	.62	< .001
Attentive Error	.71 (.05)	.62	< .001
Inspired Error	.68 (.05)	.54	< .001

Note: NSS = Need Satisfaction Scale; SRG = Stress-Related Growth; PANAS = Positive and Negative Affect Schedule

Table 3

Standardized Indirect Effects and Confidence Intervals for the Structural Model (N = 520)

Parameter Estimate	*Standardized Indirect Effect*	R^2	*95% CI*	*p*
Competence → SRG → Positive Affect	.06	.079	.03, .09	< .001
Relatedness → SRG → Positive Affect	.04	.064	.01, .07	< .001
Autonomy → SRG → Positive Affect	.02	.050	-.01, .05	> .05

Table 4

Comparisons of Parameters for the Original Sample (N = 520) and the Mean Bootstrap Sample of 2,000.

Paths	Unstandardized Regression Weights					Standardized Regression Weights				
	Original Sample	Mean Bootstrap Sample	Difference (Bias)	SE of Mean Bootstrap	SE-Bias	Original Sample	Mean Bootstrap Sample	Difference (Bias)	SE of Mean Bootstrap	SE-Bias
Competence to SRG	2.531	2.56	.029	.592	.013	.225	.226	.001	.049	.001
Autonomy to SRG	.828	.819	-.009	.534	.012	.089	.089	.000	.058	.001
Relatedness to SRG	1.213	1.212	-.001	.411	.009	.15	.149	.000	.050	.001
SRG to Positive Affect	.019	.019	.000	.003	.000	.254	.255	.001	.043	.001
	Covariance					Correlation				
Competence and Autonomy	.333	.332	-.001	.049	.001	.495	.493	-.001	.052	.001
Competence and Relatedness	.239	.238	-.001	.052	.001	.309	.307	-.002	.056	.001
Relatedness and Autonomy	.401	.399	-.003	.056	.001	.428	.425	-.002	.052	.001