

Motiv Emot (2015) 39:11–24
DOI 10.1007/s11031-014-9427-0

ORIGINAL PAPER

Predicting the brighter and darker sides of interpersonal relationships: Does psychological need thwarting matter?

Sebastiano Costa · Nikos Ntoumanis ·
Kimberley J. Bartholomew

Published online: 17 September 2014
© Springer Science+Business Media New York 2014

Abstract Recent studies have indicated that assessments of need thwarting better predict diminished functioning and ill-being compared to low need satisfaction, which better predict optimal functioning and well-being. In this study we aimed to further explore the important theoretical distinction between psychological need thwarting and need satisfaction in the domain of interpersonal relationships. We examined whether the distinction between need satisfaction and thwarting is due to method effects resulting from positive and negative item wording, however, multi-trait multi-method analyses indicated no substantial method effects. Further, we showed that a lack of need satisfaction (i.e., need dissatisfaction) is not equivalent to experiences of need thwarting. In fact, need thwarting better predicted compromised relational functioning compared to need dissatisfaction. Need satisfaction was a stronger predictor of interpersonal competence compared to need thwarting and need dissatisfaction. The current findings underline the importance of assessing need thwarting when examining compromised functioning in interpersonal relationships.

Keywords Self-determination theory · Psychological needs · Need thwarting · Interpersonal sensitivity · Interpersonal competence

Introduction

Self-determination theory (SDT; Deci and Ryan 2000) represents a broad conceptual framework for the study of human motivation and personality development. Deci and Ryan postulated that there are three universal psychological needs, namely autonomy, competence, and relatedness, which must be satisfied for effective human functioning. Within SDT these three needs are viewed as nutrients that are essential for people's survival, growth, and integrity (Ryan et al. 1996). The need for autonomy refers to the desire to self-organize experience and feel volitional and responsible for one's own behavior (deCharms 1968). The need for competence refers to the desire to feel effective and skillful in activities and obtain desired outcomes (White 1959). Finally, the need for relatedness refers to one's desire to feel connected to others (Baumeister and Leary 1995). As such, individuals are more likely to be intrinsically motivated and display signs of healthy psychological adjustment when they can freely choose to perform actions, deal effectively with optimally challenging tasks, and feel supported and accepted by people who are important to them.

Many studies have shown that the satisfaction of these basic psychological needs predicts psychological well-being (e.g., Reis et al. 2000; Ryan et al. 2010). Furthermore, Patrick et al. (2007) found that need satisfaction was positively related with relationship quality, positive affect, vitality, and adaptive responses to conflict. Other studies (e.g., La Guardia et al. 2000; Patrick et al. 2007) have

S. Costa (✉)
Section of Psychology, Department of Human and Social
Sciences, University of Messina, Via Bivona, 98122 Messina,
Italy
e-mail: scosta@unime.it

N. Ntoumanis
Curtin University, Perth, Australia

K. J. Bartholomew
University of East Anglia, Norwich, UK

shown that individuals who reported higher levels of need satisfaction also reported having better relationships with parents, friends, and romantic partners. The purpose of this paper is to examine how the three needs advanced by SDT predict optimal and diminished functioning in interpersonal relationships. In doing so we advance previous research by addressing a number of conceptual and measurement issues regarding the operationalization and measurement of psychological needs.

Psychological need satisfaction, dissatisfaction, and thwarting

Previous SDT-based research has also investigated relations between need satisfaction and various maladaptive outcomes, such as burnout and other negative affective states (e.g., Hodge et al. 2008; Reinboth et al. 2004). Although these studies have indicated that low need satisfaction is associated with ill-being, this pattern of results has not always been replicated in other studies (e.g., Adie et al. 2008; Gagne et al. 2003; Quested and Duda 2010). Such inconsistent findings have led some authors to argue that the three psychological needs may be more pertinent in explaining well-being as opposed to ill-being (McDonough and Crocker 2007). However, more recently researchers have begun to explore the explanatory role of psychological need thwarting in predicting ill-being and diminished human functioning (Bartholomew et al. 2011a, b).

Bartholomew et al. (2011a, b) posited that low scores on measures of psychological need satisfaction may simply reflect need dissatisfaction and not adequately tap the active nature and intensity of need frustration that Deci and Ryan (2000) described as states of need thwarting. Although there have been recent attempts to measure the negative side of psychological needs (e.g., Sheldon and Gunz 2009; Van den Broeck et al. 2010), such attempts do not explicitly distinguish between a lack of need satisfaction (i.e., need dissatisfaction) and need thwarting. For instance, one could feel incompetent in doing an activity because they do not have the necessary skills to perform well (despite ample support from their social environment) or because they are undermined by others. Thus, an item stating “I feel incompetent” could potentially reflect a lack of need satisfaction (first example) or need thwarting. Similarly, someone could feel lonely because they have very different interests from their immediate social milieu and cannot create meaningful connections (i.e., need dissatisfaction) or because they feel rejected or isolated by them (i.e., need thwarting).

Bartholomew et al. (2011b) argued that it is important to differentiate between a lack of need satisfaction (i.e., need dissatisfaction) and experiences of need thwarting (i.e., perceptions that psychological needs are actively undermined by

others). They also argued that need thwarting is more likely to lead to negative outcomes and ill-being than a mere lack of psychological need satisfaction. However, Bartholomew et al. did not empirically substantiate this argument. The present study represents an attempt to empirically substantiate the assertions made by Bartholomew et al. It was, therefore, necessary to include a measure of need dissatisfaction alongside assessments of need satisfaction and need thwarting.

Need thwarting (also called need frustration) taps the personal experience of having ones psychological needs undermined *as a result of* social contextual influences (e.g., “There are times when I am told things that make me feel incompetent”); it does not assess the social context per se. Past research (e.g., Bartholomew et al. 2011a, b; Balaguer et al. 2012; Gillet et al. 2012; Stebbings et al. 2012) has shown only moderate correlations between measures of the social context (e.g., controlling environments) and perceptions of need thwarting, indicating that need thwarting does not refer to the social context but to one’s experiential state of their needs being undermined within a social milieu.

Bartholomew et al. (2011a) developed and validated a measure designed to tap psychological need thwarting in the sport context. The authors demonstrated that, compared to need satisfaction, need thwarting better predicted feelings of exhaustion. Contrastingly, need satisfaction was a stronger predictor of vitality. Further, Bartholomew et al. (2011b) demonstrated that whilst athletes’ perceptions of need satisfaction predicted positive outcomes associated with sport participation (vitality and positive affect), need thwarting more consistently predicted maladaptive outcomes (disordered eating, burnout, depression, negative affect, somatic complaints and perturbed physiological functioning). Furthermore, these authors demonstrated that daily fluctuations in psychological need satisfaction and thwarting during training predicted corresponding daily fluctuations in well- and ill-being, respectively. In addition, psychological need thwarting has been shown to mediate the relationship between negative (controlling) dimensions of the social environment and indices of ill-being in sport (Balaguer et al. 2012), as well as unhealthy weight control behaviors (Ng et al. in press). Gunnell et al. (2013) have also offered evidence for the unique predictive role of psychological need thwarting, over and above need satisfaction, in terms of explaining negative affective states in a sample of recreational exercisers.

These findings provide clear evidence for the utility of measuring need thwarting alongside need satisfaction in the physical activity domain. Collectively, they indicate that need thwarting may be a better predictor of diminished functioning and ill-being and could, therefore, further our understanding of the mechanisms contributing to ill-health,

beyond the contribution made by need satisfaction. However, whether the distinction between need thwarting and need satisfaction is simply due to method effects associated with the positive (satisfaction) versus negative (thwarting) items, or because these need constructs represent conceptually independent factors, is yet to be determined. Using multi-trait multi-method confirmatory factor analyses (MTMM; CFA), Sheldon and Hilpert (2012) modeled positive and negative (the latter representing a mixture of need dissatisfaction and thwarting) items on method factors and on trait factors labeled as autonomy, competence, and relatedness need satisfaction. Results indicated the presence of method effects due to item wording (i.e., positive vs. negative), however, a model with method-only factors did not fit well. The authors concluded that the method effects did not bias the measurement of the three need satisfaction variables and suggested that both positive and negative dimensions of the three needs should be assessed. This conclusion aligns well with Bartholomew et al. (2011b) suggestion that need satisfaction and need thwarting are best viewed as independent constructs which can co-occur in a given context and, over time, differentially contribute to the prediction of a number of positive and negative outcomes.

A limitation of Bartholomew et al.'s (2011a, b) work in arguing for the separate assessments of need satisfaction and need thwarting is that it did not demonstrate that need thwarting is different from a lack of need satisfaction (i.e., need dissatisfaction) or whether it has differential predictive effects. In this study we aim to advance previous research and simultaneously test the utility of differentiating among need satisfaction, a lack of need satisfaction (i.e., need dissatisfaction), and the thwarting of psychological needs. Specifically, we test their predictive utility in explaining optimal and diminished functioning in interpersonal relationships.

Psychological needs, interpersonal relationships, and well-being

We chose to test our research question regarding the dimensionality of the three psychological needs in the relationships domain because the concept of basic psychological needs provides an important explanatory mechanism for understanding how relationship experiences are associated with relational functioning and personal well-being. For example, Deci et al. (2006) showed that need fulfillment in close friendships was related to improved relationship quality. Furthermore, in a sample of dating couples, La Guardia (2007) showed that greater need satisfaction was associated with greater emotional awareness, openness to internally processing emotions, and emotional disclosure to one's partner. These associations

have also been supported by Leak and Cooney (2001) who reported that satisfaction of the need for autonomy within romantic relationships led to greater relationship satisfaction and commitment. In addition, Ryan et al. (2005) demonstrated that greater need satisfaction was associated with greater willingness to rely on relational partners. However, further SDT-based research is needed to elucidate the role of the psychological needs in relational experiences (La Guardia and Patrick 2008). In this paper, we predict two important variables within the relationship domain which have not previously been examined from an SDT-based perspective, namely interpersonal sensitivity and interpersonal competence.

Boyce and Parker (1989) defined interpersonal sensitivity as undue and excessive awareness of, and sensitivity to, the behavior and feelings of others. Individuals with high interpersonal sensitivity are preoccupied with their interpersonal relationships, overly vigilant to the behavior and moods of others, and excessively sensitive to fluctuations in interpersonal interactions—particularly to perceived or actual criticism or rejection. This frequent misinterpretation of others' interpersonal behavior results in discomfort in the presence of others as well as interpersonal avoidance and non-assertive behavior. Furthermore, interpersonal sensitivity is characterized by a sense of personal inadequacy (Masillo et al. 2014) and has been associated with depression (Boyce et al. 1991; Boyce et al. 1998) as well as negative problem-solving strategies and low self-esteem (McCabe et al. 1999). Given the detrimental impact of interpersonal sensitivity on relationship outcomes and its association with indices of ill-being such as depression, interpersonal sensitivity can be seen to represent the darker side of relational functioning.

On the other hand, interpersonal competence is defined by capabilities of disclosing personal feelings and offering support, and the use of compromise and negotiation to manage conflicts with others (Buhrmester et al. 1988). Hence it can be associated with the brighter side of relationship functioning. Proficiency in each of these interpersonal tasks contributes uniquely to success in initiating and maintaining different types of interactions and relationships (Lipton and Nelson 1980). In addition, past research has indicated that interpersonal competence is positively related to measures of well-being and relationship satisfaction, and negatively correlated with measures of anxiety, depression, and loneliness (Buhrmester et al. 1988; Eberhart and Hammen 2006; Herzberg et al. 1998; Lamke et al. 1994).

Thus, interpersonal sensitivity and interpersonal competence represent two fundamental aspects of relational functioning (Butler et al. 2007) for which the concept of psychological needs could provide important explanatory mechanisms for their occurrence (La Guardia and Patrick

2008). Deci and Ryan (2000) proposed that the thwarting of basic psychological needs will lead to non-optimal functioning. It is likely that the thwarting of the need for relatedness in one's life and associated feelings of rejection and isolation will play a key role in this instance. For example, research suggests that rejection experiences promote interpersonal sensitivity as individuals start to anxiously expect rejection from others (Harb et al. 2002). Unsuccessful interactions with others and feelings of incompetence in one's life may also lead to feelings of low interpersonal self-efficacy which are frequently associated with interpersonal sensitivity and compromised psychological adjustment (Butler et al. 2007). Finally, the thwarting of the need for autonomy and the tendency to feel that one's life is controlled by external factors could facilitate the non-assertive behavior observed in those individuals with high levels of interpersonal sensitivity (Boyce et al. 1992; Vidyanidhi and Sudhir 2009).

In contrast, Deci and Ryan (2000) propose that people function and develop most effectively when they experience satisfaction of their autonomy, competence, and relatedness needs. Previous experiences of need satisfaction could promote interpersonal competence; in fact, previous studies have shown that people who experience feelings of need satisfaction are more willing to authentically express their emotions (La Guardia 2007) and more readily turn to their partner for support (Ryan et al. 2005). In addition, Patrick et al. (2007) found that when one feels that his or her needs are being met, he or she employs more adaptive responses to conflict.

In sum, the rigid behaviors and poor relation functioning reflected by interpersonal sensitivity (versus the more adaptive behaviors and healthy functioning manifested by interpersonal competence) could be the result of life experiences that have resulted in feelings of psychological need thwarting (versus need satisfaction). For example, individuals with thwarted psychological needs feel inadequate, insecure, and controlled or manipulated by others. Whilst these relations align well with the theoretical arguments of Deci and Ryan (2000), they have not been tested empirically.

The present study

The aims of the current research were: (1) to explore whether need thwarting is different from a lack of need satisfaction (i.e., need dissatisfaction) or whether their distinction is largely due to method effects, and (2) examine the differential predictive effects of psychological need satisfaction, thwarting, and dissatisfaction with respect to predicting optimal and diminished functioning in interpersonal relationships. We hypothesized that: (a) need thwarting, need satisfaction, and need dissatisfaction would

represent three correlated dimensions with small method effects, (b) interpersonal competence would be most strongly predicted by need satisfaction, and (c) interpersonal sensitivity would be most strongly predicted by need thwarting.

Method

Participants

Four hundred and thirty-three participants (Male = 238; Female = 195) were recruited through Amazon's Mechanical Turk (mTurk) website. The participants were between 18 and 70 years old ($M = 29.04$; $SD = 9.18$). The sample was ethnically diverse with 79 % of participants being Indian, 16 % White-USA, and 5 % from other backgrounds. This ethnic distribution is in line with previous research recruiting participants from this website (Palaolacci et al. 2010; Ross et al. 2010; Mason and Suri 2012). The majority of individuals who take part in studies advertised on mTurk are from the United States and India because Amazon allows cash payment only in US dollars and Indian Rupees. Two hundred and three participants were single (47 %), 120 were married with children (28 %), 77 were married without children (18 %), 14 were engaged (3 %), 10 were living with a partner (2 %), 4 were divorced or separated (1 %), and 3 participants were widowed (1 %). In terms of education level, the majority of participants reported that they had a university degree (84 %).

Measures

Psychological need thwarting

Need thwarting was assessed using an adapted version of the 12-item Psychological Need Thwarting Scale (PNTS; Bartholomew 2011a, b). The scale was originally designed to tap the thwarting of autonomy (4 items), competence (4 items), and relatedness (4 items) needs in sport. The stem used in the adapted version of the questionnaire was modified to tap experiences of need thwarting in one's life ("In my life..."). Participants responded on a 7-point scale ranging from 1 (*not true at all*) to 7 (*very true*). A CFA indicated good model fit [$\chi^2(51) = 226.46$, $p < .001$; S-B $\chi^2(51) = 154.78$; $p < .001$, R-CFI = .95; R-RMSEA = .07 (90 % CI = .06–.08)] and all items demonstrated satisfactory factor loadings (see Table 1).

Psychological need satisfaction

The Basic Psychological Needs Satisfaction Scale-general version (BPNS-general version; Ilardi et al. 1993) was used

Table 1 Factor loading and error variances

Item	Factor loading	ε
<i>Need thwarting</i>		
AU I feel prevented from making choices	.680	.733
AU I feel pushed to behave in certain ways	.745	.667
AU I feel forced to follow decisions made for me	.774	.633
AU I feel obliged to follow plans made for me	.719	.695
CO I feel inadequate because I am not given opportunities to fulfill my potential	.731	.682
CO Situations occur in which I am made to feel incapable	.736	.677
CO There are times when I am told things that make me feel incompetent	.750	.662
CO I feel other people are envious when I achieve success.	.681	.732
RE There are situations where I am made to feel inadequate	.719	.696
RE I feel I am rejected by those around me	.783	.622
RE I feel others can be dismissive of me	.807	.590
RE I feel other people dislike me	.721	.693
<i>Need satisfaction</i>		
AU I feel like I am free to decide for myself how to live my life	.698	.716
AU I generally feel free to express my ideas and opinions	.647	.762
AU People I interact with on a daily basis tend to take my feelings into consideration	.645	.764
AU I feel like I can pretty much be myself in my daily situations	.584	.811
CO People I know tell me I am good at what I do	.665	.747
CO I have been able to learn interesting new skills recently	.742	.671
CO Most days I feel a sense of accomplishment from what I do	.666	.746
RE I really like the people I interact with	.698	.716
RE I get along with people I come into contact with	.691	.723
RE I consider the people I regularly interact with to be my friends	.691	.722
RE People in my life care about me	.700	.714
RE People are generally pretty friendly towards me	.523	.852
<i>Need dissatisfaction</i>		
AU I generally don't feel free to choose how to do things for myself	.749	.663
AU I usually feel like I have to pretend to be something different from what I really am	.734	.680
AU I believe I have no choice about doing what I usually do	.775	.632
AU What I do in my daily life, is often not what I'd like to do	.681	.732
AU I usually feel like I have to keep my ideas and opinions to myself	.668	.744

Table 1 continued

Item	Factor loading	ε
CO I do not usually feel that I have achieved much from what I do	.616	.788
CO I often feel like I don't have the opportunity to improve myself	.742	.670
CO I often do not feel able in what I do	.750	.662
CO I think I usually do pretty bad in my activities, compared to other people	.711	.703
CO Generally I am not satisfied with my performance	.722	.692
RE I usually try to avoid interacting with the other people in my life	.765	.644
RE I feel like I can't really trust the people around me	.685	.728
RE I don't usually have a lot of opportunity to interact with other people	.761	.649
RE I usually feel uneasy around other people	.771	.637
RE I tend to feel distant from other people	.765	.644

AU autonomy; CO competence; RE relatedness; factor loading = standardized factor loadings; ε = error variances; All factor loadings are statistically significant ($p < .05$)

to assess the extent to which participants viewed their psychological needs to be satisfied in their lives. Given the aim of this study, only the positively worded BPNS items were used (as the remaining items were a mix of need dissatisfaction and need thwarting). The modified measure contained 12 items and assessed the satisfaction of autonomy (4 items), competence (3 items), and relatedness (5 items). Participants responded on a 7-point scale ranging from 1 (*not true at all*) to 7 (*very true*). A CFA indicated good model fit [$\chi^2(51) = 219.07$; $p < .001$, S-B $\chi^2(51) = 134.64$, $p < .001$; R-CFI = .95; R-RMSEA = .06 (90 % CI = .05–.07)] and all items demonstrated satisfactory factor loadings (see Table 1).

Psychological need dissatisfaction

A 15-item scale was developed by the authors to measure the dissatisfaction of the basic psychological needs for autonomy (5 items), competence (5 items), and relatedness (5 items) in one's life. The scale was developed re-writing six items from the BPNS to tap need dissatisfaction. For example, the need satisfaction item "I generally feel free to express my ideas and opinions." was changed to "I usually feel like I have to keep my ideas and opinions to myself." Finally, nine new items were written by the authors (e.g., "Generally I am not satisfied with my performance"). Participants responded on a 7-point scale ranging from 1 (*not true at all*) to 7 (*very true*). A CFA indicated acceptable model fit [$\chi^2(87) = 501.41$, $p < .001$; S-B

$\chi^2(87) = 308.06, p < .001$; R-CFI = .93; R-RMSEA = .08 (90 % CI = .07–.09)] and all items demonstrated satisfactory factor loadings (see Table 1).

Interpersonal sensitivity

The Interpersonal Sensitivity Measure (IPSM; Boyce and Parker 1989) is a 36-item self-report measure, which assesses five different components of interpersonal sensitivity. The first subscale (interpersonal awareness) refers to the way in which an individual appraises and accords meaning to a situation (e.g., “I worry about the effect I have on other people”). The second subscale (need for approval) assesses the extent to which an individual needs to be approved by others (e.g., “I will go out of my way to please someone I am close to”). The third subscale (separation anxiety) assesses undue anxiety due to possible separation from a significant other (e.g., “I feel insecure when I say goodbye to people”). Timidity, the fourth subscale, focuses on behavioral characteristics, particularly the inability to be able to respond assertively (e.g., “I will do something I do not want to do rather than offend or upset someone”). Finally, the fragile inner-self subscale assesses difficulty with self-disclosure for fear of being rejected or ridiculed (“My value as a person depends enormously on what others think of me”). Participants responded on a 4-point scale ranging from 1 (*very unlike me*), to 4 (*very like me*). The reliability and validity of the overall scale and the individual sub-scales have been supported in previous research (e.g., Boyce and Parker 1989; Vidyanidhi and Sudhir 2009).

Interpersonal competence

Participants’ perceived interpersonal competence was measured using the 40-item Interpersonal Competence Questionnaire (ICQ; Buhrmester et al. 1988). Each item describes an interpersonal situation and participants rate their level of competence and comfort in that situation using a 5-point scale, ranging from 1 (*I’m poor at this; I’d feel so uncomfortable and unable to handle the situation, I’d avoid it if possible*) to 5 (*I’m extremely good at this; I’d feel very comfortable and could handle this situation very well*). The ICQ measures perceived competence in five specific domains (8-item subscales): (a) initiation of interactions and/or relationships (e.g., “Asking or suggesting to someone new that you get together and do something”); (b) disclosure, or skillfully disclosing information to others (e.g., “Telling a close companion things about yourself that you’re ashamed of.”); (c) negative assertion, or asserting displeasure with others (e.g., “Telling a companion you don’t like a certain way he or she has

been treating you.”); (d) emotional support, or skill at providing emotional support and advice to others (e.g., “Helping a close companion get to the heart of a problem s/he is experiencing”); and (e) conflict management, or managing disagreements and conflicts with other people (e.g., “Being able to take a companion’s perspective in a fight and really understand his or her point of view”). The reliability and validity of the ICQ have been well-documented (e.g., Buhrmester et al. 1988).

Procedure

An online survey was set up and posted on Amazon’s mTurk website (www.mturk.com), an internet-based platform that allows one to request survey completions for a small honorarium. The survey took around 10 min to complete. Participants received \$0.10 for their participation, a small reward consistent with past mTurk studies (Buhrmester et al. 2011; Brandt and Wetherell 2012). Similar to studies by Gardner et al. (2012) and Taylor and Ahn (2012), only participants who had 85 % or more of their previous mTurk assignments completed, as shown by the website statistics, were allowed to participate. Previous studies have shown that mTurk participants are highly motivated to complete the tasks, even when they were offered only a few cents for several minutes of work (Buhrmester et al. 2011; Mason and Suri 2012). mTurk is a valuable data collection tool for researchers (Mason and Suri 2012). Importantly, research suggests that mTurk participants perform similarly to participants recruited in “traditional ways” (Paolacci et al. 2010).

Participants could leave the survey at any time and around 20 % of individuals who accessed the survey dropped out after reading the consent form. These dropout levels are in line with previous studies using mTurk and other online surveys. It has been shown that in these studies such dropout did not affect data quality. Further, the data obtained are at least as reliable as those obtained via traditional methods (Buhrmester et al. 2011; Manfreda et al. 2008; Musch and Reips 2000; Paolacci et al. 2010). A Latin Square design was used to randomize the order in which the questionnaires were presented to the participants.

Data analyses

EQS v6.1 (structural equation modeling software, Bentler and Wu 2002) was used to carry out the confirmatory factor analyses (CFAs), MTMM, and structural equation modeling (SEM). Examination of Mardia’s normalized coefficient indicated that the data departed from multivariate normality. Subsequently, the robust maximum likelihood estimation procedure was used for all analyses.

Hu and Bentler (1999) argued for using combinations of cut-off values to examine model fit. Accordingly, we examined the Robust Sattora–Bentler (S–B) version of the Chi square statistic, and robust versions of fit indices such as the Comparative Fit Index (CFI), the Standard Root Mean-Square Residual (SRMR) and the Root Mean Square Error of Approximation (RMSEA). Hu and Bentler (1999) proposed that values of CFI that are equal or greater than .95, value of SRMR lower than .08 and values of RMSEA that are equal or lower than .06 indicate excellent model fit. In addition to these indexes, the expected cross-validation index (ECVI) was also used in the MTMM CFA analyses with lower values representing a better fitting model.

We used CFA MTMM analyses to assess trait and method effects. The relative goodness of fit between increasingly constrained models was analyzed via the S–B χ^2 difference test (Sattorra and Bentler 2001) using the “sbdiff” software (Crawford 2007; Crawford and Henry 2003). However, because the χ^2 statistic is influenced by sample size, and because the S–B χ^2 difference test can sometimes produce an invalid negative value (Sattorra and Bentler 2001), a change in CFI of $\leq .01$ between a less and a more constrained model was considered as evidence in favor of the latter (Cheung and Rensvold 2002). We also examined whether the parameter estimates in the models were within the range of permissible values or failed to converge, as such problems can appear in MTMM CFA (Marsh and Grayson 1995). If a model failed to converge, or if it converged to an improper solution (e.g., correlations above 1), then it was not deemed a credible one.

Results

Descriptive statistics and correlation analysis

Means, standard deviations, alphas, skewness and kurtosis values for all variables are listed in Table 2. The internal reliabilities for all subscales were above .70. Interpersonal sensitivity and interpersonal competence were negatively correlated ($r = -.195, p < .001$). Inter-correlations among autonomy, competence, and relatedness scores, separately for the need thwarting, need satisfaction, and need dissatisfaction scales, were large (range $r = .69-.84$) and are presented in Table 3. Correlations among the overall need thwarting, need satisfaction, and need dissatisfaction scores were small to moderate: need satisfaction and need thwarting $r = -.183, p = .001$; need thwarting and need dissatisfaction: $r = .372, p < .001$; need satisfaction and need dissatisfaction: $r = -.153, p = .001$). For this reason, and because we were interested in testing the overarching need constructs as opposed to any particular need,

Table 2 Internal reliabilities and descriptive statistics

	α	Min	Max	M	SD	Skew	Kurt
<i>Need thwarting</i>							
Thwarting autonomy	.82	1.00	7.00	4.08	1.29	-.27	-.15
Thwarting competence	.82	1.00	7.00	4.03	1.29	-.25	-.17
Thwarting relatedness	.84	1.00	7.00	3.81	1.41	-.18	-.59
<i>Need satisfaction</i>							
Satisfaction autonomy	.75	1.00	7.00	4.84	1.16	-.37	-.12
Satisfaction competence	.72	1.33	7.00	4.90	1.16	-.66	.24
Satisfaction relatedness	.79	1.40	7.00	4.97	1.09	-.43	-.23
<i>Need dissatisfaction</i>							
Dissatisfaction autonomy	.85	1.00	7.00	3.86	1.29	-.07	-.29
Dissatisfaction competence	.84	1.00	7.00	3.71	1.32	-.03	-.41
Dissatisfaction relatedness	.87	1.00	7.00	3.69	1.36	.06	-.42
<i>Interpersonal sensitivity</i>							
Interpersonal awareness	.74	1.14	4.00	2.64	.56	-.20	-.13
Need for approval	.70	1.25	4.00	2.89	.49	-.11	-.02
Separation anxiety	.74	1.00	4.00	2.61	.53	-.28	.22
Timidity	.72	1.00	4.00	2.68	.52	-.08	.25
Fragile inner-self	.73	1.00	4.00	2.45	.66	-.26	-.05
<i>Interpersonal competence</i>							
Initiating relationships	.81	1.00	4.88	3.20	.73	-.34	.29
Asserting displeasure	.80	1.00	5.00	3.16	.69	-.42	.62
Self-disclosure	.80	1.00	4.75	3.16	.69	-.54	.85
Provide emotional support	.85	1.13	5.00	3.36	.74	-.36	.55
Manage interpersonal conflicts	.80	1.13	4.88	3.22	.69	-.43	.66
<i>Total score</i>							
Need thwarting	.89	1.00	7.00	3.98	1.20	-.26	-.02
Need satisfaction	.91	1.72	7.00	4.90	1.05	-.46	-.10
Need dissatisfaction	.92	1.00	7.00	3.76	1.23	-.01	-.25
Interpersonal sensitivity	.87	1.25	4.00	2.65	.45	-.15	.71
Interpersonal competence	.86	1.15	4.85	3.22	.63	-.62	1.33

Min minimum observed score; *Max* maximum observed score; *Skew* skewness; *Kurt* kurtosis

overall scores for the need thwarting, need satisfaction, and need dissatisfaction variables were used when predicting relational functioning.

Table 3 Correlation analyses

	Th. autonomy	Th. competence	Th. relatedness	Sat. autonomy	Sat. competence	Sat. relatedness	Dis. autonomy	Dis. competence
Th. competence	.73**							
Th. relatedness	.69**	.76**						
Sat. autonomy	-.12*	-.20**	-.26**					
Sat. competence	-.05	-.12*	-.21**	.73**				
Sat. relatedness	-.06	-.12*	-.23**	.81**	.80**			
Dis. autonomy	.33**	.30**	.30**	-.11*	-.060	-.04		
Dis. competence	.31**	.36**	.35**	-.16**	-.14**	-.13**	.84**	
Dis. relatedness	.28**	.28**	.32**	-.19**	-.17**	-.18**	.76**	.80**

Th. thwarting, Sat satisfaction, Dis. dissatisfaction

* $p < .05$; ** $p < .001$

CFA MTMM analyses

Several MTMM models have been developed in recent years; we present a series of models which are most frequently applied in the CFA framework to test the structure of trait and method effects. Need thwarting, need satisfaction, and need dissatisfaction were regarded as trait factors, whereas the positive and negative items were considered two different methods employed to assess the different traits. A schematic portrayal of the five model structures analyzed is presented in Fig. 1. Model 1 (correlated traits, correlated methods) contains five latent factors and postulated the existence of both trait and method effects. Model 2 (no traits, correlated methods) tested two method factors only. Model 3 (no methods, correlated traits) had three trait factors only and postulated no method effects. Model 4 (correlated traits, uncorrelated methods) was the same as Model 1 except that the two method factors were uncorrelated. Finally, Model 5 (correlated traits, correlated uniqueness) postulated three trait factors; method effects were tested as residual error (uniqueness) covariances as opposed to latent factors. In accordance with Eid et al. (2006), error terms were correlated in a method-specific manner. Hence, we correlated the error terms of negatively worded variables (the three needs for the first method factor tapping dissatisfaction and thwarting), but we did not correlate the error terms of the positively worded variables (i.e., the three needs for the second method factor tapping satisfaction).

Although a number of different questions can be addressed by comparing these competing models, the question we were interested in was how substantial the method effects were; we were less interested in how these effects were represented (i.e., latent factors or correlated uniqueness). The comparison of models (Fig. 1) positing trait and method effects and those positing trait effects only determines the extent to which method effects exist. Also,

method effects can be ascertained by the size of the loadings on the method factors or the size of the correlated uniqueness terms (Marsh and Grayson 1995).

Goodness of fits indices were calculated for all five models (see Table 4). Results indicated that Models 1, 3, 4, and 5 met the rigorous cut-off criteria for model fit. Model 2, which postulated method effects only, did not fit well. However, Model 1 did not converge (as is often the case; Marsh and Grayson 1995) and in Model 5 most correlations among the uniqueness terms were substantially above 1, and hence this was deemed an improper solution. Thus, both models were not interpreted further. Model 3, which tested for trait effects only, fitted very well, but slightly worse than Model 4 which postulated trait and method effects. In Model 4 trait factor loadings were moderate to high (median = .72), providing support for the stability of traits across different methods. Finally, the method factor loadings in Model 4 were small to moderate (median of method factor loadings = .44) indicating some method effects. Thus, whilst method effects were present, these were not sufficiently large to discard trait effects.

SEM analyses

SEM analyses were employed to examine whether need thwarting, need satisfaction, and need dissatisfaction could predict positive relationship experiences (interpersonal competence) and negative relationship experiences (interpersonal sensitivity). Psychological need thwarting, dissatisfaction and satisfaction were indexed by the average scores of each respective need state. Interpersonal sensitivity and competence were indexed by the average score of each subscale of the two questionnaires assessing these two constructs. The intercorrelations among these three need-based and two relationship-based factors appear in Table 5. Prior to testing the

Fig. 1 CFA MTMM models. Note NT need thwarting, ND need dissatisfaction, NS need satisfaction, AUT autonomy, COM competence, REL relatedness

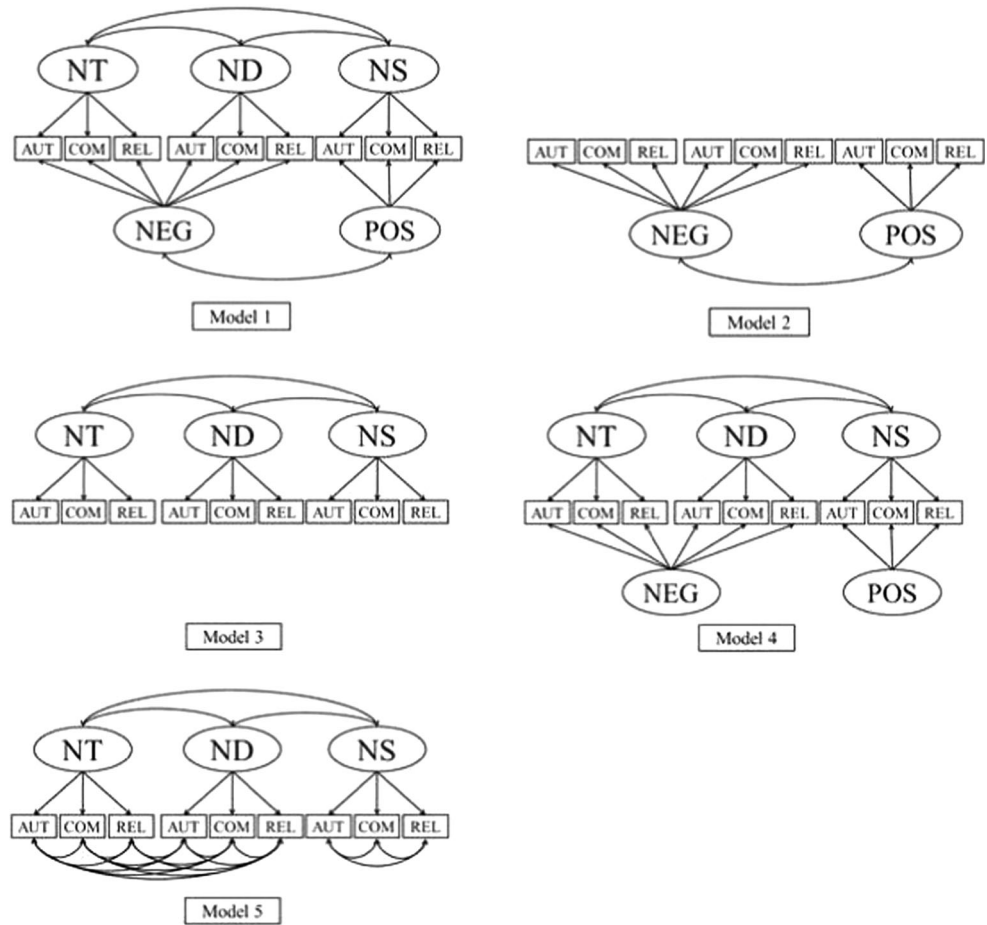


Table 4 Summary of goodness of fit indices for the CFA MTMM models

		$S-B \chi^2$	df	p	RCFI	SRMR	RRMSEA (90 % CI)	RECVI	$\Delta S-B \chi^2$	Δdf	ΔCFI
Model 1	Correlated traits, correlated methods	15.72	14	.33	.999	.017	.017 (.000–.051)	0.18			
Model 2	No traits, correlated methods	529.78	26	<.01	.711	.159	.212 (.196–.227)	1.31	463.57***	11	.273
Model 3	Correlated traits, no methods	67.25	24	<.01	.975	.040	.065 (.046–.083)	0.25	24.23**	9	.009
Model 4	Correlated traits, uncorrelated methods	42.89	15	<.01	.984	.033	.066 (.043–.089)	0.24			
Model 5	Correlated traits, correlated uniqueness	3.50	6	.74	1.00	.028	.000 (.000–.044)	0.19			

S–B χ^2 = Satorra–Bentler scaled Chi square statistic; RCFI = robust comparative fit index; RNNFI = robust non-normed fit index; SRMR = standardized root mean residual; RRMSEA = robust root mean square error of approximation 90 % CI = 90 % confidence interval for the RRMSEA point estimate; RECVI = robust expected cross-validation index; $\Delta S-B \chi^2$ = Satorra–Bentler scaled Chi square difference; Δdf = difference in degrees of freedom; $\Delta RCFI$ = change in RCFI; $\Delta S-B \chi^2$, Δdf , and $\Delta RCFI$ refer to comparisons with Model 4. Only models with proper solutions were compared. Model 1 did not converge and Model 5 produced an improper solution

* $p < .05$; ** $p < .01$; *** $p < .001$

hypothesized models, we examined associations between the study variables and a number of demographic variables, namely age, ethnicity, and gender. These variables did not significantly predict any of the dependent

variables and accounted for only between 0 and 3 % of the variance of the dependent variables. As such, these demographic variables were not utilized in subsequent analyses.

Table 5 Intercorrelations among need-based and relationship-based factors

	1	2	3	4
1. Need thwarting	–			
2. Need satisfaction	-.20***	–		
3. Need dissatisfaction	.41***	-.15**	–	
4. Interpersonal sensitivity	.66***	-.18**	.39***	–
5. Interpersonal competence	-.29***	.44***	-.17**	-.23***

** $p < .01$; *** $p < .001$

The hypothesized model (Fig. 2) demonstrated a good fit to the data: $\chi^2(143) = 712.76, p < .001$; $S-B\chi^2(143) = 528.68, p < .001$; $R-CFI = .90$; $R-RMSEA = .08$ (90 % CI .07–.09). Interpersonal competence was predicted by need satisfaction ($\beta = .39; p < .001$) and to a lesser extent by need thwarting ($\beta = -.21, p < .001$). The path from need dissatisfaction was not significant ($\beta = -.02, p = .35$). Interpersonal sensitivity was predicted by need thwarting ($\beta = .59, p < .001$), marginally by need dissatisfaction ($\beta = .14; p = .05$), but not by need satisfaction ($\beta = -.04, p = .16$).

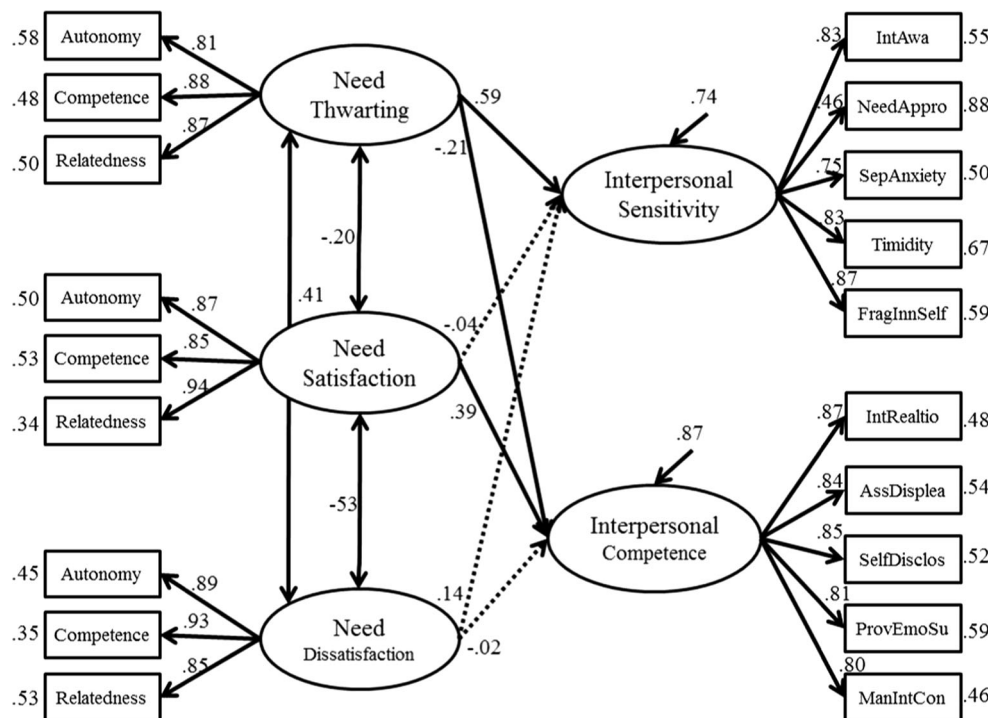
Discussion

The purpose of the present research was to extend recent work on the positive and negative dimensions of psychological needs (Bartholomew et al. 2011a 2011b; Sheldon

and Gunz 2009; Van den Broeck et al. 2010) by empirically testing the differentiation between need satisfaction, need dissatisfaction, and need thwarting. Whilst psychological need satisfaction has been extensively studied in the SDT literature, psychological need thwarting still remains a relatively understudied component of SDT. Firstly, we examined the degree to which the distinction between the positive and negative dimensions of needs is a methodological artifact (i.e., due to item wording). We only found small method effects. The second aim was to empirically test Bartholomew et al.’s (2011b) claim that need thwarting should not be equated with a lack of need satisfaction (dissatisfaction), and their subsequent assertion that need thwarting, as opposed to a lack of need satisfaction, is more likely to predict negative outcomes and ill-being. We found support for this claim.

Previous research assessing need thwarting has predominately been conducted in the physical activity context and there is a lack of evidence as to whether it can be applied to understand one’s generalized life experiences. As such, the PNTS stem and items (Bartholomew 2011a) were adapted to assess perceptions of need thwarting in one’s life. The scores of the amended measure demonstrated good factorial validity and internal reliability. The domain of interpersonal relationships offered an interesting context in which to test the predictive utility of the various need constructs because the proposed motivational mechanisms through which interpersonal experiences are likely to benefit or harm relationships and the individuals

Fig. 2 Structural model of associations between need thwarting, need satisfaction, need dissatisfaction, interpersonal competence and interpersonal sensitivity. Note Dotted lines represent non-significant parameters



involved in them are still relatively unknown (La Guardia and Patrick 2008).

Distinguishing between need satisfaction, need dissatisfaction, and need thwarting

Drawing from Bartholomew et al. (2011b), we argued that it is important to distinguish between need dissatisfaction and need thwarting when predicting negative outcomes. We also wanted to test whether the distinction between the positive and negative dimensions of needs primarily reflects method effects. Thus, a multi-trait (need thwarting, need satisfaction, and need dissatisfaction) multi-method (positive items and negative items) CFA approach was used to analyze the factor structure of the basic psychological needs.

The fit indices for models with correlated traits (Models 3 and 4), the moderately high factor loadings of the traits, and the small to moderate correlations among the corresponding needs of the three traits, supported the factor structure of three separate need constructs. Need satisfaction, need dissatisfaction, and need thwarting are, therefore, best represented as independent constructs. The model with no method effects (Model 3) showed an excellent fit to the data. However, it would be surprising if there were no method effects whatsoever, as such effects are expected in survey studies. Method effects were evident in that the models with such effects (Model 4) fitted slightly better than the model without such effects (Model 3), however, these effects were not deemed substantial given the excellent fit indices of Model 3 and the poor fit indices of the model that posited only methods factors (Model 2). In sum, the results provide preliminary evidence for clear distinctions between the need thwarting, need satisfaction, and need dissatisfaction constructs that is attributable to the presence of different traits and is not simply due to methodological artifacts (positive and negative wording).

Predicting relational functioning

We hypothesized that need thwarting would be a better predictor of diminished relational functioning than need dissatisfaction and satisfaction. We also expected that need satisfaction would be a better predictor of optimal functioning compared to the other two dimensions of needs. Results of the SEM analyses supported these hypotheses and suggested that need thwarting was the strongest predictor of interpersonal sensitivity (negative relationship experiences). Need satisfaction and need dissatisfaction did not predict/only marginally predicted interpersonal sensitivity. In contrast, need satisfaction was the strongest predictor of interpersonal competence. Need thwarting also

significantly predicted interpersonal competence but negatively and to a lesser extent.

Therefore, in line with SDT and the arguments made in the introduction, the more individuals feel controlled and experience feelings of rejection and incompetence, the more their relationships are likely to suffer as individuals struggle to function optimally in this important area of their life. On the other hand, individuals who are exposed to life situations in which they are able to experience feelings of autonomy, competence, and relatedness are more like to function better in their relationships. The current study is the first to examine the wider impact of general need satisfaction and need thwarting on functioning in relationships as previous research in this area has tended to examine the extent to which individuals experience satisfaction of the psychological needs within specific relationships and how this, in turn, impacts upon the quality of that relationship (e.g., La Guardia et al. 2000; Patrick et al. 2007).

Lack of need satisfaction (i.e., need dissatisfaction) demonstrated poor predictive utility in the current study. Previous research (e.g., McDonough and Crocker 2007) has indicated that psychological needs may be more pertinent in explaining well-being as opposed to ill-being or other negative outcomes. However, our findings support Bartholomew et al.'s (2011b) assertion regarding the importance of including a measure of need thwarting (and not simply a measure of low need satisfaction) when negative outcomes are the focus of an investigation. Furthermore, the current findings also provide an important insight into the motivational mechanisms associated with the psychological experiences of individuals in relationships (La Guardia and Patrick 2008). Specifically, the present study adds to our understanding of the importance of psychological needs not only as they pertain to optimal relationship functioning but also as they relate to diminished relational experiences (Patrick et al. 2007).

For example, individuals who experience high levels of need satisfaction in their lives are also likely to demonstrate high levels of interpersonal competence because they can initiate interactions (autonomy), be skillful in disclosing information to others (competence), and can offer emotional support (relatedness; Buhrmester et al. 1988). The distinction between need thwarting and need dissatisfaction is also important in the relationships context. One may feel he/she lacks the capacity to make key decisions in his/her life because they are indecisive and concerned about making the wrong choices, however another individual may feel controlled because they feel pushed to behave in certain ways and forced to follow decisions made for them. It is likely that the second individual will perceive their need for autonomy to be thwarted and will, in turn, demonstrate higher levels of interpersonal sensitivity (e.g., characterized by non-assertive behavior) in

comparison to the first individual who will experience a lack of autonomy need satisfaction (i.e., need dissatisfaction). With regard to competence, an individual may not feel a sense of accomplishment from what he/she does in life because they do not have the necessary skills to perform well, however another individual may feel incompetent (despite having the necessary skills to perform well) because others are demeaning and critical of him/her. It is likely that the second individual will perceive their need for competence to be thwarted and will, in turn, demonstrate higher levels of interpersonal sensitivity (e.g., characterized by feelings of inadequacy) in comparison to the first individual who might experience a lack of competence need satisfaction. Lastly, with regard to relatedness, an individual may not feel related to those around them because they have very different interests from their immediate social milieu and cannot create meaningful connections, however another individual may feel rejected or isolated by others in their social environment. Again, it is likely that the second individual will perceive their need for relatedness to be thwarted and will, in turn, demonstrate higher levels of interpersonal sensitivity (e.g., characterized by interpersonal avoidance) in comparison to the first individual who will experience a lack of relatedness need satisfaction (i.e., need dissatisfaction).

Limitations and future research directions

Whilst the present study has extended previous research on need thwarting and has improved current knowledge in relation to the factorial structure of the basic need constructs, a number of avenues for further research remain. For example, future research is needed to explore the social-environmental conditions that may sustain or frustrate the psychological needs in different life domains. Previous research (Bartholomew et al. 2011b) has shown that utilizing an approach that includes assessments of both autonomy support and control, as well as need satisfaction and need thwarting, reflects a more comprehensive examination of the psychological experiences of individuals in different social environments and can potentially provide a better understanding of the motivational factors that result in variability in health-related outcomes. It is expected that: (1) high levels of autonomy support will lead to high levels of need satisfaction (2) a lack of autonomy support will lead to a lack of need satisfaction (i.e., need dissatisfaction) and (3) control will lead to experiences of need thwarting. However, there is currently very little research which examines these relations in other life domains. Future research could also explore the individual contributions and salience of each of the three needs for autonomy, competence, and relatedness in the etiology of diminished functioning and ill-being in different life contexts

(McDonough and Crocker 2007). Deci and Ryan (2000) assert that optimal, healthy development requires all three needs to be satisfied.

Limitations of this research include the fact that only a single study was conducted, using subjects recruited by an online survey. Although previous studies have shown the reliability and validity of this type of data (Buhrmester et al. 2011; Mason and Suri 2012), replicability of the results and generalizability to other populations still needs to be demonstrated. Another limitation of this study is its cross-sectional design. Consequently, no conclusions can be drawn about the direction of effects; it is plausible that reciprocal relations may exist between the need statuses and relationship variables examined. Future experimental and longitudinal work on need thwarting would complement the current study.

In summary, the current research extends previous studies on need thwarting and provides evidence for the usefulness of this concept in the interpersonal relationships context. The ongoing application of the SDT framework as an approach to understanding compromised functioning, as well as optimal well-being, remains important in addressing both the darker and brighter sides of human functioning. The concept of psychological need thwarting (as opposed to need dissatisfaction) should be further researched in various life domains if the development of diminished functioning and ill-being is to be properly understood and prevented.

References

- Adie, J. W., Duda, J. L., & Ntoumanis, N. (2008). Autonomy support, basic need satisfaction and the optimal functioning of adult male and female sport participants: A test of basic needs theory. *Motivation & Emotion*, *32*, 189–199.
- Balaguer, I., González, L., Fabra, P., Castillo, I., Mercé, J., & Duda, J. L. (2012). Coaches' interpersonal style, basic psychological needs and the well- and ill-being of young soccer players: A longitudinal analysis. *Journal of Sport Sciences*, *30*, 1619–1629.
- Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011a). Self-determination theory and diminished functioning: The role of interpersonal control and psychological need thwarting. *Personality and Social Psychology Bulletin*, *37*, 1459–1473.
- Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., & Thøgersen-Ntoumani, C. (2011b). Psychological need thwarting in the sport context: Assessing the darker sides of athletic experience. *Journal of Sport and Exercise Psychology*, *33*, 75–102.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497–529.
- Bentler, P. M., & Wu, E. J. C. (2002). *EQS 6 for windows user's guide*. Encino, CA: Multivariate Software Inc.
- Boyce, P., Harris, M., Silove, D., Morgan, A., Wilhelm, K., & Hadzi-Pavlovic, D. (1998). Psychosocial factors associated with depression: a study of socially disadvantaged women with

- young children. *The Journal of Nervous and Mental Disease*, 186, 3–11.
- Boyce, P., Hickie, I., Parker, G., Mitchell, P., Wilhelm, K., & Brodaty, H. (1992). Interpersonal sensitivity and the one-year outcome of a depressive episode. *Australasian Psychiatry*, 26, 156–161.
- Boyce, P., & Parker, G. (1989). Development of a scale to measure interpersonal sensitivity. *Australian and New Zealand Journal of Psychiatry*, 23, 341–351.
- Boyce, P., Parker, G., Barnett, B., Cooney, M., & Smith, F. (1991). Personality as a vulnerability factor to depression. *The British Journal of Psychiatry*, 159, 106–114.
- Brandt, M. J., & Wetherell, G. (2012). What attitudes are moral attitudes? The case for heritability. *Social Psychology and Personality Science*, 3, 172–179.
- Buhrmester, D., Furman, W., Wittenberg, M. T., & Reis, H. T. (1988). Five domains of interpersonal competence in peer relationships. *Journal of Personality and Social Psychology*, 55, 991–1008.
- Buhrmester, M., Kwang, T., & Gosling, S. D. (2011). Amazon's Mechanical Turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science*, 6, 3–5.
- Butler, J. C., Doherty, M. S., & Potter, R. M. (2007). Social antecedents and consequences of interpersonal rejection sensitivity. *Personality and Individual Differences*, 43, 1376–1385.
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, 9, 233–255.
- Crawford, J. R. (2007). Sbdiff.exe [computer software]. Retrieved May 6, 2009, from <http://www.abdn.ac.uk/psy086/dept/sbdiff.htm>.
- Crawford, J. R., & Henry, J. D. (2003). The depression anxiety stress scales: Normative data and latent structure in a large non-clinical sample. *The British Journal of Clinical Psychology*, 42, 111–131.
- DeCharms, R. (1968). *Personal causation: The internal affective determinants of behavior*. New York: Academic press.
- Deci, E. L., La Guardia, J. G., Moller, A. C., Scheiner, M. J., & Ryan, R. M. (2006). On the benefits of giving as well as receiving autonomy support: Mutuality in close friendships. *Personality and Social Psychology Bulletin*, 32, 313–327.
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227–268.
- Eberhart, N. K., & Hammen, C. L. (2006). Interpersonal predictors of onset of depression during the transition to adulthood. *Personal Relationships*, 13, 195–206.
- Eid, M., Lischetzke, T., & Nussbeck, F. W. (2006). Structural equation models for multitrait–multimethod data. In M. Eid & E. Diener (Eds.), *Handbook of multimethod measurement in psychology* (pp. 283–299). Washington, DC: American Psychological Association.
- Gagne, M., Ryan, R. M., & Bargmann, K. (2003). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. *Journal of Applied Sport Psychology*, 15, 372–390.
- Gardner, R. M., Brown, D. L., & Boice, R. (2012). Using Amazon's Mechanical Turk website to measure accuracy of body size estimation and body dissatisfaction. *Body Image*, 9, 532–534.
- Gillet, N., Fouquereau, E., Forest, J., Brunault, P., & Colombat, P. (2012). The impact of organizational factors on psychological needs and their relations with well-being. *Journal of Business and Psychology*, 27, 437–450.
- Gunnell, K. E., Crocker, P. R. E., Wilson, P. M., Mack, D. E., & Zumbo, B. D. (2013). Psychological need satisfaction and thwarting: A test of basic psychological needs theory in physical activity contexts. *Psychology of Sport and Exercise*, 14, 599–607.
- Harb, G. C., Heimberg, R. G., Fresco, D. M., Schneier, F. R., & Leibowitz, M. R. (2002). The psychometric properties of the Interpersonal Sensitivity Measure in social anxiety disorder. *Behavior Research and Therapy*, 40, 961–979.
- Herzberg, D. S., Hammen, C., Burge, D., Daley, S. E., Davila, J., & Lindberg, N. (1998). Social competence as a predictor of chronic interpersonal stress. *Personal Relationships*, 5, 207–218.
- Hodge, K., Lonsdale, C., & Ng, J. Y. Y. (2008). Burnout in elite rugby: Relationships with basic psychological needs fulfillment. *Journal of Sports Sciences*, 26, 835–844.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1–55.
- Iardi, B. C., Leone, D., Kasser, T., & Ryan, R. M. (1993). Employee and supervisor ratings of motivation: Main effects and discrepancies associated with job satisfaction and adjustment in a factory setting. *Journal of Applied Social Psychology*, 23, 1789–1805.
- La Guardia, J. G. (2007). *At the end of the day, where do we stand? Daily emotional engagement and need satisfaction within couples*. Paper presented at Annual meeting of the Society for Personality and Social Psychology, Memphis, TN.
- La Guardia, J. G., & Patrick, H. (2008). Self-determination theory as a fundamental theory of close relationships. *Canadian Psychology*, 49, 201–209.
- La Guardia, J. G., Ryan, R. M., Couchman, C. E., & Deci, E. L. (2000). Within-person variation in security of attachment: A self-determination theory perspective on attachment, need fulfillment, and well-being. *Journal of Personality and Social Psychology*, 79, 367–384.
- Lamke, L. K., Sollie, D. L., Durbin, R. G., & Fitzpatrick, J. A. (1994). Masculinity, femininity and relationship satisfaction: The mediating role of interpersonal competence. *Journal of Social and Personal Relationships*, 11, 535–554.
- Leak, G. K., & Cooney, R. R. (2001). Self-determination, attachment styles, and well-being in adult romantic relationships. *Representative Research in Social Psychology*, 25, 55–62.
- Lipton, D. N., & Nelson, R. O. (1980). The contribution of initiation behaviors to dating frequency. *Behavior Therapy*, 11, 59–67.
- Manfreda, K. L., Bosnjak, M., Berzelak, J., Haas, I., & Vehovar, V. (2008). Web surveys versus other survey modes. *International Journal of Market Research*, 50, 79–104.
- Marsh, H. W., & Grayson, D. (1995). Latent variable models of multitraitmultimethod data. In R. H. Hoyle (Ed.), *Structural equation modeling* (pp. 177–198). Thousand Oaks, CA: Sage.
- Masillo, A., Valmaggia, L. R., Lanna, A., Brandizzi, M., Lindau, J. F., Curto, M., et al. (2014). Validation of the Italian version of interpersonal sensitivity measure (IPSM) in adolescents and young adults. *Journal of Affective Disorders*, 156, 164–170.
- Mason, W. A., & Suri, S. (2012). Conducting behavioral research on Amazon's Mechanical Turk. *Behavior Research Methods*, 44, 1–23.
- McCabe, R. E., Blankstein, K. R., & Mills, J. S. (1999). Interpersonal sensitivity and social problem-solving: relations with academic and social self-esteem, depressive symptoms, and academic performance. *Cognitive Therapy and Research*, 23, 587–604.
- McDonough, M. H., & Crocker, P. R. E. (2007). Testing self-determined motivation as a mediator of the relationship between psychological needs and affective and behavioral outcomes. *Journal of Sport & Exercise Psychology*, 29, 645–663.
- Musch, J., & Reips, U. D. (2000). A brief history of web experimenting. In M. H. Birnbaum (Ed.), *Psychological experiments on the internet* (pp. 61–87). San Diego, CA: Academic Press.
- Ng, J. Y. Y., Ntoumanis, N., & Thøgersen-Ntoumani, C. (2014). Autonomy support and control in weight management: What

- important others do and say matters. *British Journal of Health Psychology*, *19*, 540–552.
- Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2010). Running experiments on Amazon Mechanical Turk. *Judgment and Decision Making*, *5*, 411–419.
- Patrick, H., Knee, C. R., Canevello, A., & Lonsbary, C. (2007). The role of need fulfillment in relationship functioning and well-being: A self-determination theory perspective. *Journal of Personality and Social Psychology*, *92*, 434–457.
- Quested, E., & Duda, J. L. (2010). Exploring the social-environmental determinants of well- and ill-being in dancers: A test of basic needs theory. *Journal of Sport & Exercise Psychology*, *32*, 39–60.
- Reinboth, M., Duda, J. L., & Ntoumanis, N. (2004). Dimensions of coaching behavior, need satisfaction, and the psychological and physical welfare of young athletes. *Motivation & Emotion*, *28*, 297–313.
- Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., & Ryan, R. M. (2000). Daily well being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin*, *26*, 419–435.
- Ross, J., Irani, L., Silberman, M. S., Zaldivar, A., & Tomlinson, B. (2010). Who are the crowdworkers? Shifting demographics in Amazon Mechanical Turk. In K. Edwards & T. Rodden (Eds.), *Proceedings of the ACM conference on human factors in computing systems* (pp. 2863–2872). New York: ACM.
- Ryan, R. M., Bernstein, J. H., & Brown, K. W. (2010). Weekends, work, and well-being: Psychological need satisfactions and day of the week effects on mood, vitality, and physical symptoms. *Journal of Social and Clinical Psychology*, *29*, 95–122.
- Ryan, R. M., La Guardia, J. G., Solky-Butzel, J., Chirkov, V. I., & Kim, Y. (2005). On the interpersonal regulation of emotions: Emotional reliance across gender, relationships, and culture. *Personal Relationships*, *12*, 146–163.
- Ryan, R. M., Sheldon, K. M., Kasser, T., & Deci, E. L. (1996). All goals are not created equal: An organismic perspective on the nature of goals and their regulation. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 7–26). New York: Guilford Press.
- Satorra, A., & Bentler, P. M. (2001). A scaled difference Chi square test statistic for moment structure analysis. *Psychometrika*, *66*, 507–514.
- Sheldon, K. M., & Gunz, A. (2009). Psychological needs as basic motives, not just experiential requirements. *Journal of Personality*, *77*, 1467–1492.
- Sheldon, K. M., & Hilpert, J. (2012). The balanced measure of psychological needs (BMPN) scale: An alternative domain general measure of need satisfaction. *Motivation and Emotion*, *36*, 439–451.
- Stebbing, J., Taylor, I. M., Spray, C. M., & Ntoumanis, N. (2012). Antecedents of perceived coach interpersonal behaviors: the coaching environment and coach psychological well- and ill-being. *Journal of Sport & Exercise Psychology*, *34*, 481–502.
- Taylor, E. G., & Ahn, W. K. (2012). Causal imprinting in causal structure learning. *Cognitive Psychology*, *65*, 381–413.
- Van den Broeck, A., Vansteenkiste, M., Lens, W., & De Witte, H. (2010). Unemployed individuals' work values and job flexibility: An explanation from expectancy-value theory and self-determination theory. *Applied Psychology: An International Review*, *59*, 296–317.
- Vidyanidhi, K., & Sudhir, P. M. (2009). Interpersonal sensitivity and dysfunctional cognitions in social anxiety and depression. *Asian Journal of Psychiatry*, *2*, 25–28.
- White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, *66*, 297–333.