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The Confounding Role of Basic Needs Satisfaction Between Self-Determined Motivation and Well-Being

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Abstract In this study three different theories grounded on Self-determination macro-theory (Basic Psychological Needs Theory, Organismic Integration Theory, and Hierarchical Model of Intrinsic and Extrinsic Motivation) were combined into a single structural model to evaluate its goodness-of-fit to empirical data. It consisted on a model where basic psychological needs satisfaction was associated directly to well-being, and indirectly through the mediation of self-determined motivation. Since in this model the satisfaction of basic psychological needs would predict positively both self-determined motivation and well-being, basic psychological needs is considered to function as a confounding variable. The participants of the study consisted of 673 Spanish secondary education students (334 girls and 339 boys) with a mean age of 14.0 years ($SD = 1.4$). The model was confirmed partially. Direct associations between basic psychological needs satisfaction and psychological consequences were found and in the expected directionality. On the contrary, indirect associations between basic psychological needs satisfaction and psychological consequences were found, but generally with the opposite expected directionality. The sign of these indirect associations depended on whether components involved on the associations (basic psychological needs satisfaction, self-determined motivation and psychological consequences) were measured at the same or at different levels. Finally, the results found evidence of the confounding role of basic psychological needs between self-determined motivation and psychological consequences. Implications of these results for Basic Psychological Needs Theory, Organismic Integration Theory, and Hierarchical Model of Intrinsic and Extrinsic Motivation are discussed.

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1 Introduction

1.1 Self-Determination Macro-Theory

Self-determination theory (SDT) is a macro-theory of human motivation and personality, concerning people's inherent growth tendencies and their innate psychological needs. SDT comprises of five mini-theories, each of which focuses on one facet of motivation or personality functioning. As we will see later, there is a substantial body of empirical evidence that support this Macro-Theory. However, research performed under this theoretical framework has studied their mini-theories separately and little effort, if any, has been dedicated to investigate unifying models that incorporates several of these theories. In order to cover this void, in the present study three theories grounded on SDT were integrated into a single model, where basic psychological needs satisfaction played the role of a confounding variable between self-determined motivation and well-being. Later, its statistical fit was evaluated with good results. Next, we briefly describe the theories integrated into the model.

1.2 Basic Psychological Needs Theory and the Relation Between the Fulfillment of Basic Psychological Needs and Well-Being

Basic Psychological Needs Theory (BPNT) is a mini-theory that focuses on the concept of basic psychological needs and how they relate to psychological health and well-being. According to BPNT (Deci and Ryan 1991), needs are defined as nutrients essential to a living being's growth, integrity and health. Deci and Ryan have argued that in humans, at least three types of nutrients are functionally essential for ongoing personal growth, integrity and well-being. These needs are autonomy, competence and relatedness. They are thought to be universal across people and cultures and applicable in all aspects of a person's life. Factors that facilitate autonomy, competence and relatedness are expected to enhance well-being, whereas factors that hinder fulfillment of these needs should undermine well-being. The need for competence is fulfilled by the experience that one can effectively bring about desired effects and outcomes. The need for autonomy involves perceiving that one's activities are endorsed by or congruent with the self. Finally, the need for relatedness is fulfilled by feeling that one is close and connected to significant others.

In accordance with BPNT, there is a growing body of evidence that supports the relation between the satisfaction of basic psychological needs and well-being. This relation has been documented in trait variations among people (Reis et al. 2000; Sheldon et al. 1996), in day-to-day within-person fluctuations (La Guardia et al. 2000; Reis et al. 2000; Sheldon et al. 1996) and also with longitudinal data (Sheldon and Elliot 1999). The relation between the satisfaction of basic psychological needs and well-being has been found in a variety of settings. For example, employees' reports of satisfaction of their needs for autonomy, competence and relatedness in the workplace were positively related to self-esteem and general health (Ilardi et al. 1993). In other studies, satisfaction of the basic psychological needs was positively related to vitality and negatively related to anxiety and somatization,

not only in the United States (Baard et al. 2004) but also in Bulgaria (Deci et al. 2001). In a nursing home context, satisfaction of the basic psychological needs was positively related to well-being and perceived health among residents (Kasser and Ryan 1999; Vallerand and O'Connor 1989).

1.3 Organismic Integration Theory and the Relation Between Intrinsic Motivation and Well-Being

Organismic Integration Theory (OIT) is a mini-theory that distinguishes between different forms of motivation and describes their properties, determinants and consequences. It proposes that there are distinct types of motivation: intrinsic motivation, extrinsic motivation and amotivation. These types of motivation are considered to represent different reasons for acting and can be ordered in gradation along a self-determination continuum. Intrinsic motivation it is considered the prototype of self-determined motivation. The next most self-determined motivation is extrinsic motivation. Extrinsic motivation is divided into several forms of external regulations that can also be ordered in different gradations of self-determination. In order of the most self-determined to the least, they are: integrated regulation, identified regulation, introjected regulation and external regulation. Finally, amotivation represents the lack of both types of motivation and, therefore, captures the least self-determined motivation.

OIT postulates that the more autonomous (or self-determined) the motivational regulation is, the stronger its relation to positive affective, cognitive and behavioral consequences (Deci and Ryan 1991). Relative to positive cognitive and behavioral consequences, studies in education have shown that autonomous motivation is associated with better performance (Miserandino 1996), fewer dropouts (Vallerand and Bissonnette 1992), better conceptual understanding (Benware and Deci 1984; Grolnick and Ryan 1987), better teacher ratings (Hayamizu 1997), and proactive coping with failures (Ryan and Connell 1989). Affective consequences include engagement (Connell and Wellborn 1991), interest (e.g., Koestner et al. 1984; Ryan and Connell 1989), enjoyment (Ryan and Connell 1989), positive emotions (Ryan and Connell 1989), satisfaction (Deci et al. 1989; Vallerand and Bissonnette 1990; Vallerand et al. 1989, 1993) and less anxiety (Gottfried 1985; Ryan and Connell 1989). In other words, these studies suggest that autonomous motivation is associated not only with better performance in school but also with higher well-being.

1.4 Hierarchical Model of Intrinsic and Extrinsic Motivation

Grounded in the SDT mini-theories set forth by Deci and Ryan (1985), Vallerand (1997) developed the Hierarchical Model of Intrinsic and Extrinsic Motivation (HMIEM), in which he stated that social factors have an impact on motivation through the mediation of perceptions of competence, autonomy and relatedness (Corollary 3.2). Vallerand distinguished three different types of motivation (intrinsic and extrinsic motivation and amotivation; Postulate 1), and considered that motivation has important consequences of at least three types: affective, cognitive, and behavioral (Postulate 5). Specifically, he hypothesized that the more self-determined is the motivation, the more positive are the consequences (Corollary 5.1).

In addition to that, Vallerand proposed that different types of motivation (i.e., intrinsic motivation, extrinsic motivation and amotivation) exist at three levels of generality (Postulate 2). The first level of motivation pertains to the motivation experienced by an

individual toward a given activity at a specific point in time (i.e., situational motivation). The second level deals with more generalized motivation toward broad life contexts (such as interpersonal relationships, education, work, religion, and others). This contextual level refers to a self-referent system used by individuals to describe their motivations in a particular sphere of activities. Motivation at the last level of generality refers to a global motivational orientation at the personality level. It refers to relatively enduring individual differences with respect to people's motivations.

According to Vallerand, there is a top-down impact of motivation at higher levels of the hierarchy on motivation at the next lower level (Corollary 3.3). More precisely, motivation at one level should have a stronger top-down impact on motivation at the next lower level than on motivation at a more distant level. For instance, global motivation should have a greater impact on contextual motivation than on situational motivation, and contextual motivation should have a greater impact on situational motivation than would global motivation. Likewise, Vallerand also integrates in his model a bottom-up effect of lower levels in the hierarchy on the next level up. Therefore, HMIEM considers that adjacent motivational levels in the hierarchy have reciprocal effects (both top-down and bottom-up effects; Postulate 4). Support for this postulate comes from a longitudinal study of Guay et al. (2003). They analyzed reciprocal effects between self-determined global and self-determined school motivation, finding better fit of data when the model includes both top-down and bottom-up effects comparatively to a model involving only horizontal effects.

Like motivation, consequences can occur at all three levels of generality, and the degree of generality of the consequences depends on the level of motivation that has produced the consequences (Corollary 5.2). Thus, it is expected that global motivation should have a greater impact on global consequences than contextual motivation, and contextual motivation should have a greater impact on contextual consequences than global motivation. Empirical support for this corollary has been provided by two pilot studies. In the first pilot study, Vallerand assessed situational and contextual motivations, as well as situational consequences, in an activity described as leisure task. Results revealed that both situational and contextual motivations were related to situational consequences, being the relation stronger in the situational motivation. In the second pilot study, Vallerand evaluated three life contextual motivations (education, interpersonal relationships and leisure) and global motivation. Besides, he measured satisfaction toward the three life contexts and global life satisfaction. He found that global motivation was more related to global life satisfaction than contextual motivations. On the contrary, the three life contextual motivations were more related to satisfaction to their corresponding life context than global life satisfaction.

Summing up, HMIEM establishes, on each levels of the hierarchy (global, contextual and situational), the following sequence of motivational processes: Social factors → Basic Psychological Needs Fulfillment → Motivation → Consequences (see Vallerand 1997, 2007 Vallerand and Losier 1999). In addition, motivation and consequences at one level could influence and be influenced by the same elements of an adjacent level of the hierarchy (i.e., upper or lower level).

1.5 BPNT, OIT and HMIEN: Compatible Proposals of Human Motivation Functioning

BPNT, OIT and HMIEN are proposals of human motivation functioning that have received a sizeable amount of empirical evidence. Although these theories outline different motivational processes, they are compatible proposals. HMIEM postulates that the relation between the satisfaction of basic psychological needs and well-being is mediated by self-

determined motivation. Interestingly, OIT proposal can be subsumed under HMIEN proposal; the relation between self-determined motivation and well-being established by OIT is one of the relations contemplated in the mediational process put forward by HMIEM. Unlike OIT, BPNT consider a relation that is not taken into account by HMIEM; the direct relation between the satisfaction of basic psychological needs and well-being. Both proposals are perfectly compatible, since it is possible that the satisfaction of basic psychological needs could have both a direct and indirect effect on well-being.

1.6 Objective of the Study

The main objective of this study was to combine BPNT, OIT and HMIEN into a single model and evaluate the goodness-of-fit of this model to empirical data. Specifically, it consisted on a model where basic psychological needs satisfaction was associated directly to well-being, and indirectly through the mediation of self-determined motivation. It is expected that basic psychological needs satisfaction would predict positively self-determined motivation, which, in turn, would predict positively well-being. The direct relation between basic psychological needs satisfaction and well-being is also expected to be positive. Since in this model the satisfaction of basic psychological needs would predict positively both self-determined motivation and well-being, basic psychological needs is considered to function as a confounding variable. In other words, that at least certain amount of the relation between self-determined motivation and well-being is explained by the effect that basic psychological needs satisfaction has on them.

2 Method

2.1 Participants

Randomized cluster sampling was used to select participants. The unit (cluster) was the school. The sampling frame was all the public schools in the target region, from which schools were selected using probability proportional to school size. That is, each school on the list was assigned a weighting equivalent to the number of students attending the school. All the selected schools agreed to participate in the study. The final sample included 673 students (334 males and 339 females) with a mean age of 14.0 years ($SD = 1.4$). The students were attending five different schools and 35 classrooms. Students were distributed in first, second, third and fourth year of secondary school classes according to the following percentages: 22.0, 18.6, 32.1 and 27.3%, respectively.

2.2 Procedure

Research was conducted in compliance with APA ethical standards. Firstly, the approval from the Provincial Board of Education and Science was obtained to perform the study. Secondly, we contacted the principal of each school to explain the aim of the research and requested their permission to conduct the study at their school. Next, passive consent was obtained from parents or guardians; they received written notice from the school that their children would be participating and were invited to contact the school if they did not want their child to participate. On the day of the survey, students were invited to participate and assured that the survey was confidential and voluntary. With the purpose of trying to reduce

the possible effect of social desirability, they were informed that the researchers were interested in knowing what they thought and felt about themselves and that there were not right or wrong answers. Students filled out the questionnaires in a classroom. At least one qualified researcher (researcher with Ph.D.) was present during the administration of the instruments to provide students with the necessary support to complete the questionnaires.

2.3 Measures

2.3.1 Basic Psychological Needs Scale

Basic Psychological Needs Satisfaction was measured by the Psychological Needs Satisfaction Scale in Education (ESNPE; León et al. 2011) based on *Échelle de Satisfaction des Besoins Psychologiques* of Gillet et al. (2008). ESNPE consists of 15 items measuring three dimensions: perceived autonomy (e.g., "I fell free on my decisions"), perceived competence (e.g., "Often I feel very competent") and perceived relationship (e.g., "I feel comfortable around other people") in educational context. Responses were evaluated with a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

2.3.2 Academic Motivation Scale

A scale for measuring academic motivation according to SDT principles was developed for first time by Vallerand et al. (1989). This scale consists of 28 items distributed in seven subscales of four items each. These seven subscales measure different types of academic motivations (or reasons for attending school): three types of intrinsic motivation: Intrinsic Motivation towards Knowledge (e.g., "For the pleasure and the satisfaction it gives me to learn new things"), Intrinsic Motivation towards Accomplishment (e.g., "For the satisfaction I feel while mastering certain difficult scholar activities") and Intrinsic Motivation towards Stimulation (e.g., "Because I really enjoy attending class"), three types of extrinsic motivation (Identified Regulation, Introjected Regulation and External Regulation) and amotivation. In this study we used the Spanish version developed by Núñez et al. (2005). The answers were expressed on a 7-point Likert scale, ranging from 1 (Do not agree at all) to 7 (Agree completely), with an intermediate rating of 4 (Agree pretty much).

2.3.3 The Rosenberg Self-Esteem Scale

Self-esteem was measured by Echeburúa's (1995) Spanish version of the Rosenberg Self-esteem Scale (Rosenberg 1989). This scale is a widely-used self-esteem measure (e.g., "On the whole, I am satisfied with myself") and it is composed of 10 items concerning a person's sense of worthiness and personal value. These items were answered on a 7-point scale.

2.3.4 Self-Esteem Evaluation Questionnaire in Adolescents

This questionnaire, developed by García and Musitu (1999), evaluates five different types of self-esteem, but we only measured two of them: social self-esteem and academic self-esteem. Social self-esteem refers to the opinion that adolescents have on their social relationships (e.g., "I make new friends easily"), while academic self-esteem alludes to the opinion that adolescents have on their academic aptitudes (e.g., "My teachers consider me a hard worker"). Response options ranged from 1 (strongly disagree) to 7 (strongly agree).

2.3.5 Satisfaction with Life Scale

Satisfaction with life was assessed by means of the Spanish version of the Satisfaction with Life Scale (SWLS) by Diener et al. (1985), as validated by Núñez et al. (2010). This scale consists of five items that give a general measure of subjective well-being and life satisfaction (e.g., "I am satisfied with my life"). The answers were expressed on a seven point Likert scale.

2.3.6 Center of Epidemiological Studies Depression Scale

To measure non-clinical depression we used the Spanish version of Radloff's scale (1977), developed by Herrero and Meneses (2006). This version consists of 7 items, which evaluate depressive symptomatology over the last month (e.g., "I felt depressed"). Responses are rated on a scale of 1 (never) to 7 (always).

2.3.7 Perceived Stress Scale

Perception of stress was measured by the Spanish version of Perceived Stress Scale (PSS4; Cohen et al. 1983) by Herrero and Meneses (2006). This scale consists of 4 items which measure the degree to which respondents appraised situations as stressful within the last month (e.g., "I felt difficulties were piling up so high that I could not overcome them"). The answers were measured on a scale of 1 (never) to 7 (always).

2.3.8 UCLA Loneliness Scale

Loneliness was measured by the UCLA Loneliness Scale Version 3 (Russell 1996) using the Spanish version by Expósito and Moya (1999). This 20-item self-report scale is composed of three factors (e.g., Austin 1983; Dussault et al. 2009; Hartshore 1993; Hawkley et al. 2005). As described by Dussault et al. (2009), the first factor, labelled Isolation, reflects feelings of rejection and loneliness. The second factor, labelled Relational Connectedness, corresponds to feelings of intimacy. The last factor, labelled Collective Connectedness, is related to feelings of group identification. In this study only Isolation subscale was examined, in order to obtain an affective illness indicator (e.g., "I felt isolated from others"). The answers were measured on a Likert scale from 1 (strongly disagree) to 7 (strongly agree).

2.4 Data Analysis

First, univariate and bivariate descriptive statistics were computed for observed variables. Second, bivariate correlations and reliability of latent variables were calculated. When latent variables consist of multiple dimensions, as it is our case, McDonald's Omega Coefficient estimates the true reliability much better than Cronbach's Alpha Coefficient, a widely used reliability estimator, since it likely underestimates the true reliability at large degrees (Kamata et al. 2003). For this reason, McDonald's Omega Coefficient was used, instead of Cronbach's Alpha Coefficient, to assess the reliability of latent variables. The minimum acceptable level of reliability of latent variables was set to .70 as suggested by Bernstein and Nunnally (1994).

Third, to define latent variables, first or second order confirmatory factor analyses were carried out, depending on whether the scales measure uni- or multi-dimensional factors. Analyses were performed through Mplus 6.01 software (Muthén and Muthén 1998–2010). The metric of latent variables for each factor was set by arbitrarily fixing to unity one load (see Long 1983, pp. 49–55). To keep the confirmatory analysis to a reasonable size, an item parceling strategy was used. This also has the advantage of providing more reliable indicators than individual items and requiring the estimation of fewer parameters (Rind-skopf and Rose 1988; Marsh et al. 1989; Hull et al. 1995). The technique of parceling was used to create the first order latent variable, which always consisted of two or three parcels (items employed to create latent variables can be found on Table 1). Each parcel was formed by averaging approximately half of the corresponding items of each latent variable. In contrast, the second order latent variables were formed by loading onto their corresponding latent variables.

Fourth, multicollinearity was assessed. To accomplish that, factor scores of latent variables obtained on Mplus were saved and analyzed with SPSS Statistics for Windows, Version 20.0 (IBM Corp. 2011). Predictors would be considered collinear if variance inflation factors (VIF) values were higher than 10 (Myers 1990) or tolerance statistics values were below .2 (Menard 1995).

Finally, a single structural equation modeling (SEM), where all dependent variables were included in the model, was conducted. Analyses were also performed through Mplus. For all analyses, a level of .05 was employed for a result to be considered significant. Data were analyzed using Robust Maximum Likelihood estimator, which does not require normal distribution of observed variables, since this estimator works with robust standard errors. Missing data were dealt with by using full-information maximum likelihood procedure, which yields more efficient and less biased parameter estimates than traditional procedures (Schafer and Graham 2002).

Several goodness-of-fit indices were used to evaluate the model. The model would be considered to have a good fit when RMSEA, its upper confidence interval and SRMR values were lower than .08 (Browne and Cudeck 1993; Hu and Bentler 1998, 1999), and when CFI and TLI values were higher than .90 (e.g., Hu and Bentler 1999). Although a Chi square test for model fit was also reported, it was not used to evaluate model fit for its sensitivity on large sample sizes.

Throughout the whole study, the reported path coefficients were standardized values, and magnitude of effect sizes were interpreted according to guidelines offered by Cohen (1988, 1992). To evaluate mediation, confidence intervals of these indirect effects were calculated using the bootstrap method with 2000 samples, as a way of obtaining a significant test. MacKinnon et al. (2000) demonstrated that confounding effects can be estimated using the same statistical methods as mediation effects. Therefore indirect effects were also calculated to evaluate confounding effects.

3 Results

3.1 Descriptive Statistics for Observed Variables

Table 1 shows the descriptive statistics (bivariate correlations, means, standard deviations, skewness and kurtosis) for the parcels used in the study.

Table 1 Bivariate correlations, means, standard deviations, skewness and kurtosis for parcels

Items	Parcel		1	2	3	4	5	6	7	8	9	10	11	12
1, 10, 13	AUT 1	1												
4, 7	AUT 2	2	.60†											
6, 15	COM 1	3	.47†	.43†										
3, 9, 12	COM 2	4	.46†	.40†	.71†									
2, 11	REL 1	5	.29†	.28†	.33†	.33†								
8, 5, 14	REL 2	6	.36†	.37†	.46†	.41†	.60†							
9, 23	KNOW 1	7	.31†	.23†	.41†	.30†	.23†	.26†						
2, 16	KNOW 2	8	.33†	.26†	.40†	.30†	.22†	.28†	.86†					
4, 25	STIM 1	9	.30†	.20†	.32†	.21†	.16†	.16†	.76†	.75†				
11, 18	STIM 2	10	.26†	.20†	.30†	.20†	.18†	.21†	.64†	.63†	.70†			
6, 27	ACCOM 1	11	.30†	.20†	.38†	.33†	.25†	.25†	.79†	.78†	.72†	.60†		
13, 20	ACCOM 2	12	.32†	.26†	.37†	.34†	.26†	.25†	.75†	.77†	.67†	.61†	.83†	
6, 10, 3, 4, 1	SWL 1	13	.19†	.20†	.27†	.25†	.20†	.42†	.17†	.20†	.14†	.15†	.17†	.19†
7, 8, 5, 2, 9	SWL 2	14	.24†	.23†	.24†	.22†	.20†	.37†	.19†	.23†	.18†	.13†	.20†	.21†
1, 4, 3	GSE 1	15	.34†	.29†	.50†	.51†	.31†	.47†	.19†	.23†	.13†	.08*	.20†	.21†
2, 5	GSE 2	16	.25†	.23†	.48†	.36†	.18†	.37†	.13†	.16†	.11**	.08*	.10**	.12**
1, 2	SSE 1	17	.26†	.25†	.28†	.34†	.41†	.52†	.15†	.15†	.13†	.15†	.17†	.17†
3, 4	SSE 2	18	.27†	.24†	.27†	.29†	.36†	.50†	.11**	.13†	.08*	.11**	.11**	.12**
5, 6	SSE 3	19	.14†	.18†	.18†	.19†	.30†	.40†	−.01	−.01	−.03	.03	−.01	−.02
1, 2	ASE 1	20	.36†	.34†	.54†	.44†	.22†	.30†	.43†	.42†	.37†	.28†	.42†	.38†
3, 4	ASE 2	21	.41†	.30†	.49†	.43†	.24†	.27†	.47†	.46†	.44†	.33†	.48†	.44†
5, 6	ASE 3	22	.35†	.32†	.58†	.52†	.22†	.31†	.44†	.45†	.41†	.30†	.48†	.43†
1, 2	DEP 1	23	−.09*	−.10**	−.18†	−.11**	−.01	−.14†	−.03	−.04	−.01	.05	.00	−.02
3, 4, 5	DEP 2	24	−.04	−.07	−.17†	−.12**	−.05	−.15†	−.02	−.03	−.02	.02	.03	−.03
6, 7	DEP 3	25	−.09*	−.16†	−.25†	−.16†	−.19†	−.31†	−.11**	−.11**	−.05	−.09*	−.06	−.11**
8, 10	STR 1	26	−.20†	−.22†	−.32†	−.24†	−.21†	−.30†	−.16†	−.21†	−.15†	−.12**	−.18†	−.20†

Table 1 continued

Items	Parcel		1	2	3	4	5	6	7	8	9	10	11	12
9, 11	27	STR 2	-.18†	-.21†	-.28†	-.20†	-.17†	-.28†	-.16†	-.17†	-.11**	-.11**	-.14†	-.15†
11, 12, 13, 14	28	LON 1	-.16†	-.20†	-.20†	-.20†	-.28†	-.43†	-.07	-.10**	-.01	.01	-.07	-.07
2, 3, 17, 18	29	LON 2	-.12**	-.14†	-.20†	-.16†	-.28†	-.45†	-.02	-.07	.04	-.03	-.01	-.02
4, 7, 8	30	LON 3	-.16†	-.20†	-.27†	-.18†	-.30†	-.47†	-.12**	-.14†	-.07	-.06	-.10**	-.09*
		Mean	4.39	4.70	5.05	4.70	5.50	5.63	5.45	4.40	3.54	3.38	4.12	4.37
		SD	1.08	1.19	1.06	1.04	1.05	.93	1.51	1.52	1.48	1.44	1.54	1.55
		Skewness	-.16	-.25	-.30	-.09	-.63	-.70	-.35	-.34	.11	.23	-.11	-.27
		Kurtosis	.18	.07	.06	-.10	.40	.56	-.49	-.49	-.72	-.60	-.70	-.53

Items	Parcel		13	14	15	16	17	18	19	20	21	22	23	24
6, 10, 3, 4, 1	13	SWL 1												
7, 8, 5, 2, 9	14	SWL 2	.67†											
1, 4, 3	15	GSE 1	.37†	.36†										
2, 5	16	GSE 2	.48†	.40†	.56†									
1, 2	17	SSE 1	.27†	.23†	.45†	.26†								
3, 4	18	SSE 2	.37†	.29†	.47†	.40†	.68†							
5, 6	19	SSE 3	.22†	.19†	.32†	.33†	.51†	.49†						
1, 2	20	ASE 1	.19†	.18†	.38†	.25†	.17†	.15†	.01					
3, 4	21	ASE 2	.14†	.15†	.35†	.18†	.16†	.10**	.00	.75†				
5, 6	22	ASE 3	.21†	.16†	.40†	.28†	.18†	.13†	-.01	.82†	.73†			
1, 2	23	DEP 1	-.41†	-.36†	-.22†	-.45†	-.05	-.17†	-.11**	-.14†	-.12**	-.12**		
3, 4, 5	24	DEP 2	-.42†	-.35†	-.20†	-.46†	-.02	-.17†	-.14†	-.15†	-.10**	-.11**	.76†	
6, 7	25	DEP 3	-.54†	-.46†	-.25†	-.48†	-.19†	-.28†	-.20†	-.13†	-.08*	-.11**	.63†	.67†
8, 10	26	STR 1	-.46†	-.44†	-.34†	-.48†	-.16†	-.27†	-.15†	-.22†	-.18†	-.21†	.58†	.58†
9, 11	27	STR 2	-.46†	-.39†	-.26†	-.44†	-.12**	-.21†	-.12**	-.21†	-.16†	-.21†	.61†	.60†
11, 12, 13, 14	28	LON 1	-.47†	-.41†	-.32†	-.46†	-.27†	-.40†	-.36†	-.15†	-.09*	-.11**	.39†	.43†

Table 1 continued

Items	Parcel		13	14	15	16	17	18	19	20	21	22	23	24
2, 3, 17, 18	29	LON 2	−.44†	−.36†	−.31†	−.48†	−.34†	.44†	−.48†	−.05	.00	−.02	.40†	.45†
4, 7, 8	30	LON 3	−.48†	−.42†	−.34†	−.49†	−.32†	−.41†	−.34†	−.16†	−.10**	−.14†	.41†	.43†
		Mean	5.08	4.91	5.35	5.35	5.54	5.91	5.16	4.63	4.26	4.48	3.04	2.83
		SD	1.26	1.27	.88	1.07	1.13	1.05	1.12	1.21	1.18	1.30	1.57	1.40
		Skewness	−.43	−.51	−.28	−.69	−.64	−1.34	−.43	−.46	−.08	−.17	.67	.81
		Kurtosis	−.38	−.09	−.30	.14	.04	2.36	−.12	.22	−.01	−.22	−.21	.22

Items	Parcel		25	26	27	28	29	30
6, 7	25	DEP 3						
8, 10	26	STR 1	.61†					
9, 11	27	STR 2	.64†	.62†				
11, 12, 13, 14	28	LON 1	.39†	.40†	.38†			
2, 3, 17, 18	29	LON 2	.46†	.39†	.36†	.65†		
4, 7, 8	30	LON 3	.47†	.45†	.42†	.68†	.69†	
		Mean	2.71	3.21	3.33	2.04	2.40	2.00
		SD	1.46	1.30	1.29	.98	1.06	1.02
		Skewness	.91	.37	.37	1.41	.90	1.46
		Kurtosis	.20	−.03	.02	2.53	.52	2.08

AUT = Basic Psychological Need-Autonomy; COM = Basic Psychological Need-Competence; REL = Basic Psychological Need-Relatedness; BPN = Basic Psychological Needs; KNOW = Intrinsic Motivation-Knowledge; STIM = Intrinsic Motivation-Stimulation; ACCOM = Intrinsic Motivation-Accomplishment; IM = Intrinsic Motivation; SWL = Satisfaction with Life; GSE = General Self-Esteem; SSE = Social Self-Esteem; ASE = Academic Self-Esteem; DEP = Depressive Symptomatology; STR = Perceived Stress; LON = Loneliness

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

3.2 Bivariate Correlations and Reliability of Latent Variables

Table 2 presents bivariate correlations and McDonald's omegas for latent variables. All bivariate correlations were positive, with the exception of the correlations for Depressive Symptomatology, Perceived Stress and Loneliness. These variables had negative correlations with other variables, except with themselves. All bivariate correlations were statistically reliable, except for the correlations between Depressive Symptomatology and Intrinsic Motivation related variables (Intrinsic Motivation-Knowledge, Intrinsic Motivation-Stimulation, Intrinsic Motivation-Accomplishment and Intrinsic Motivation). McDonald's omega coefficients were all adequate, since their values were higher than .70.

3.3 Confirmatory Factorial Analysis

Subsequently, it is detailed how latent variables were defined. For Basic Needs Satisfaction, as well as Intrinsic Motivation, a second order confirmatory factor analysis was performed, since they consist of multiple dimensions. Concretely, a Basic Needs Satisfaction latent variable was allowed to load on the three types of basic needs (perceived autonomy, perceived competence and perceived relationship), which were specified by their respective parcels of items.

The Intrinsic Motivation latent variable was created by accounting for the common variance of the three types of intrinsic motivation (intrinsic motivation to know, intrinsic motivation toward accomplishment and intrinsic motivation to experience stimulation). In addition, these different types of intrinsic motivation were associated, in turn, to their corresponding parcels of items.

One may wonder why, instead of creating a latent variable for intrinsic motivation, a Self-Determination Index (SDI) was not calculated for the Academic Motivation Scale to measure student self-determination motivation along the continuum postulated by SDT, following guidelines provided by Vallerand (2001). We did it, but we had to discard the use of this index because it requires that the factor correlations of motivation types exhibit a simplex pattern. Unfortunately, as found in previous studies (Cokley 2000; Fairchild et al. 2005; Otis et al. 2005; Vallerand et al. 1993) that used the same scale, the estimated correlations deviated from the simplex pattern. Furthermore, the McDonald's (1985, 1999) omega for this index was .30, which indicates very low reliability.

Recently, Chemolli and Gagné (2014) have obtained empirical evidence against a continuum structure of two motivation scales based on SDT. One of these is Academic Motivation Scale, the scale we use to measure motivation. Besides, they have criticized the use of SDI. For example, they have questioned the weighting given to external regulations, since these weightings have not received empirical validation. As an alternative, they have recommended the analysis of different motivations separately. As a consequence of all this, we used Intrinsic Motivation, the most self-determined motivation, as a way to measure self-determination motivation.

The remaining variables consisted of just one dimension and, therefore, a first order confirmatory factor analysis was performed for them. Thus, the remaining latent variables were specified by their respective parcels of items. For all measurement models factor loadings were positive, significant and ranged from .61 to .98, being 92% of factor loadings above .70.

Table 2 Bivariate correlations and McDonald's omegas for latent variables

Latent variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. AUT															
2. COM	.60†														
3. REL	.51†	.62†													
4. BPN	.70†	.85†	.73†												
5. KNOW	.36†	.44†	.37†	.51†											
6. STIM	.33†	.40†	.35†	.47†	.88†										
7. ACCOM	.34†	.42†	.36†	.49†	.91†	.84†									
8. IM	.37†	.45†	.38†	.52†	.98†	.90†	.94†								
9. SWL	.35†	.42†	.36†	.49†	.25†	.23†	.24†	.25†							
10. GSE	.57†	.70†	.59†	.82†	.24†	.22†	.23†	.24†	.66†						
11. SSE	.43†	.53†	.45†	.62†	.15†	.14†	.14†	.15†	.44†	.65†					
12. ASE	.50†	.60†	.52†	.71†	.54†	.50†	.52†	.55†	.24†	.47†	.18†				
13. DEP	-.19†	-.23†	-.20†	-.27†	-.04	-.04	-.04	-.04	-.61†	-.56†	-.22†	-.16†			
14. STR	-.34†	-.41†	-.35†	-.49†	-.23†	-.21†	-.22†	-.24†	-.67†	-.65†	-.30†	-.29†	.91†		
15. LON	-.33†	-.41†	-.35†	-.48†	-.09*	-.09*	-.09*	-.10**	-.64†	-.66†	-.58†	-.13†	.62†	.62†	
McDonald Omega	.79	.85	.86	.92	.86	.73	.83	.92	.77	.85	.83	.89	.79	.76	.91

AUT = Basic Psychological Need-Autonomy; COM = Basic Psychological Need-Competence; REL = Basic Psychological Need-Relatedness; BPN = Basic Psychological Needs; KNOW = Intrinsic Motivation-Knowledge; STIM = Intrinsic Motivation-Stimulation; ACCOM = Intrinsic Motivation-Accomplishment; IM = Intrinsic Motivation; SWL = Satisfaction with Life; GSE = General Self-Esteem; SSE = Social Self-Esteem; ASE = Academic Self-Esteem; DEP = Depressive Symptomatology; STR = Perceived Stress; LON = Loneliness

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

3.4 Assessment of Multicollinearity

VIF values were all well below 10 (specifically, 1.494 for both predictors) and the tolerance statistics also were all well above .2 (specifically, .669 for both predictors), indicating that there was not collinearity between Basic Needs Satisfaction and Intrinsic Motivation.

3.5 Structural Model

All studied variables were included on a single structural model (see Fig. 1). This structural model consisted on a model where Basic Needs Satisfaction had a direct and indirect effect, through the mediation of Intrinsic Motivation, on psychological consequences. As a consequence, Basic Needs Satisfaction was considered a confounding variable that predicts both Intrinsic Motivation and psychological consequences. Variables considered as psychological consequences were: Satisfaction with Life, General Self-esteem, Social Self-Esteem, Academic Self-Esteem, Depressive Symptomatology, Perceived Stress and Loneliness.

The fit indices for the structural model were as follows: $\chi^2 = 912.75$, $df = 363$, $p < .001$; CFI = .95, TLI = .94; RMSEA = .05 (90% CI = .04–.05), SRMR = .05. Values of the fit indices showed that the structural model had an adequate fit, since RMSEA, its upper confidence interval and SRMR values were lower than .08, and CFI and TLI values were higher than .90.

Structural model showed that, as was expected, Basic Needs Satisfaction was positively associated with Intrinsic Motivation. The magnitude of this relation was large (.52). Also, in accordance with expectations, Basic Needs Satisfaction was positively associated with variables that measure well-being and negatively associated with variables that measure ill-being. The magnitudes of the relations with well-being variables were large or very large (ranged from .49 to .89), whereas with ill-being variables were medium or large (ranged from −.34 to −.57).

Fig. 1 Diagram of evaluated structural model. For the sake of simplicity, neither *indicators* nor *lower order latent variables* are represented in the diagram. Likewise, although the diagram only depicts two unspecific outcomes, the structural model included a total of seven outcomes, which were Satisfaction with Life, General Self-esteem, Social Self-Esteem, Academic Self-Esteem, Depressive Symptomatology, Perceived Stress and Loneliness
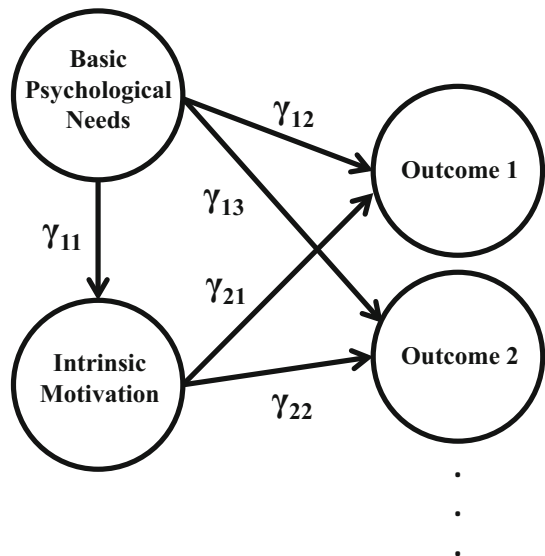
The results also revealed that the associations between Intrinsic Motivation and psychological consequences were in the opposite direction as it was expected or near to zero value. Thus, the associations between Intrinsic Motivation and well-being variables were negative or near to zero (ranged from −.19 to .00). An exception was the association between Intrinsic Motivation and Academic Self-Esteem. This association was positive (specifically, .25), as it was expected. Contrarily to what was found with well-being variables, the associations between Intrinsic Motivation and ill-being variables were positive or near to zero value (ranged from .02 to .20). These associations between Intrinsic Motivation and psychological consequences were not always significant. When the psychological consequences were General Self-esteem, Social Self-Esteem, Academic Self-Esteem, Depressive Symptomatology and Loneliness, the associations were statistically reliable. However, when they were Satisfaction with Life and Perceived Stress, the associations were not significant.

Percentages of variability of psychological consequences (not showed on Table 3) explained for structural models were close to 25% (for Satisfaction with Life, Perceived Stress and Loneliness), or higher than 40% (for General Self-Esteem, Social Self-Esteem and Academic Self-Esteem), with the exception of Depressive Symptomatology (8%).

Table 4 provides indirect effects of the structural model. This table shows that the indirect effect from Basic Needs Satisfaction to General Self-esteem (−.10), as well as to Social Self-Esteem (−.12), was negative and significant, whereas the indirect effect from Basic Needs Satisfaction to Academic Self-Esteem (.13), as well as to Loneliness (.11), was positive and significant. For all these cases the magnitudes of the effects were small. None of the remaining indirect effects of Basic Needs Satisfaction with psychological consequences were significant. In contrast to that, all the indirect effects between Intrinsic Motivation and psychological consequences (which provide estimations of the confounding effects of Basic Needs Satisfaction) were significant. Their magnitude ranged from small-medium (e.g., −.18 for Depressive Symptomatology) to large (e.g., .47 for General Self-Esteem).

Table 3 Direct effects of structural model

Path	Effect	95% CI	
		LL	UL
BNP → IM	.52†	.44	.61
BNP → SWL	.49†	.35	.63
BNP → GSE	.89†	.80	.97
BNP → SSE	.72†	.58	.86
BNP → ASE	.58†	.49	.67
BNP → DEP	−.34†	−.46	−.21
BNP → STR	−.49†	−.61	−.37
BNP → LON	−.57†	−.71	−.43
IM → SWL	.00	−.13	.12
IM → GSE	−.19†	−.29	−.09
IM → SSE	−.22†	−.34	−.11
IM → ASE	.25†	.16	.34
IM → DEP	.13*	.001	.26
IM → STR	.02	−.10	.15
IM → LON	.20†	.09	.31

95% CI = 95% Confidence interval for effect; LL = Lower limit; UL = Upper limit; BPN = Basic Psychological Needs; IM = Intrinsic Motivation; SWL = Satisfaction with Life; GSE = General Self-Esteem; SSE = Social Self-Esteem; ASE = Academic Self-Esteem; DEP = Depressive Symptomatology; STR = Perceived Stress; LON = Loneliness

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

Table 4 Indirect effects of structural model

Consequence	Indirect		95% CI	
	Path	Effect	LL	UL
General Self-Esteem	BPN → IM → GSE	−.10*	−.16	−.03
	IM → BPN → GSE	.47*	.36	.57
Social Self-Esteem	BPN → IM → SSE	−.12*	−.19	−.04
	IM → BPN → SSE	.38*	.27	.48
Academic Self-Esteem	BPN → IM → ASE	.13*	.08	.18
	IM → BPN → ASE	.30*	.24	.37
Satisfaction with Life	BPN → IM → SWL	.00	−.07	.07
	IM → BPN → SWL	.26*	.17	.35
Depressive Symptomatology	BPN → IM → DEP	.07	.00	.14
	IM → BPN → DEP	−.18*	−.25	−.10
Perceived Stress	BPN → IM → STR	.01	−.06	.08
	IM → BPN → STR	−.26*	−.34	−.18
Loneliness	BPN → IM → LON	.11*	.04	.17
	IM → BPN → LON	−.30*	−.39	−.20

95% CI = Bootstrapping 95% Confidence interval for indirect effect; LL = Lower limit; UL = Upper limit; BPN = Basic Psychological Needs; IM = Intrinsic Motivation; GSE = General Self-Esteem; SSE = Social Self-Esteem; ASE = Academic Self-Esteem; SWL = Satisfaction with Life; DEP = Depressive Symptomatology; STR = Perceived Stress; LON = Loneliness

* $p < .05$

4 Discussion

In this study three different theories grounded on SDT (BPNT, IOT and HMIEM) were combined into a single structural model to evaluate its goodness-of-fit to empirical data. According to this model, basic psychological needs satisfaction is directly and indirectly associated to well-being. Concretely, this model predicts that the indirect relation between basic psychological needs satisfaction and psychological consequences is mediated through self-determined motivation. That is, basic psychological needs satisfaction should be associated to self-determined motivation, which in turn, should be related to well-being. Since this model also establishes that intrinsic motivation and psychological consequences are directly predicted by basic psychological needs satisfaction, this model considers basic psychological needs satisfaction a confounding variable.

The model was confirmed partially, since not all the expected relations were found. In spite of this, goodness-of-fit indices of the model were adequate and the model was able to explain a sizeable amount of variability of psychological consequences (varied from 25 to 40%). As it was expected by the proposed model, direct associations between basic psychological needs satisfaction and psychological consequences were found. These associations were significant and in the predicted direction: positive for well-being variables and negative for ill-being variables. The magnitudes of these associations ranged from medium to very large. This finding has theoretical and statistical implications. The theoretical implication is that a model that considers only an indirect relation between basic psychological needs satisfaction and psychological consequences, as HMIEM does, omits a crucial relation; the direct relation between them. A statistical implication of this omission

is that the mentioned indirect relation cannot be properly tested because a necessary statistical assumption for mediation analysis is not met; that no important variables or other influences were omitted from the model (MacKinnon 2008, p. 54).

Similarly, as expected by the proposed model, a direct association between basic psychological needs satisfaction and self-determined motivation was found. This association was significant and in the predicted direction: positive. Thus, taking all these results together, results indicate that basic psychological needs satisfaction is associated to both self-determined motivation and psychological consequences, which supports the confounding role of basic psychological needs satisfaction postulated by our model. Statistical analyses of the indirect effects between self-determined motivation and psychological consequences through the mediation of basic psychological needs satisfaction (which test the confounding effects of basic psychological needs satisfaction) revealed that all indirect effects were significant, providing further and stronger evidence of the confounding role of basic psychological needs satisfaction. This finding concurs with BPNT that postulates that satisfaction of psychological needs satisfaction foster well-being and optimal functioning, including self-determined motivation.

Another prediction of the proposed model was that the satisfaction of basic psychological needs should have an indirect effect on psychological consequences though the mediation of self-determined motivation. This indirect effect should be positive for well-being variables and negative for ill-being variables. This prediction was only confirmed on one of the variables: academic self-esteem. For the rest of the variables, or the indirect effect was not significant (this was the case for satisfaction with life, depressive symptomatology and perceived stress), or it was significant but in the opposite direction (this was the case for general self-esteem, social self-esteem and loneliness). The statistical reason why the expected indirect effects are not found it is due to the fact that the associations between self-determined motivation and psychological consequences were in the opposite direction or they were null. These results are inconsistent with OIT. OIT claims that self-determined motivation should be positively related to psychological health (Deci and Ryan 1991). In opposition to this claim, we have found that self-determined motivation was negatively associated to well-being variables, positively to ill-being variables or not significantly associated to some consequences. An exception was found with academic self-esteem. It is noteworthy that, even though our results are contrary to OIT predictions, our data did not stand in contradiction to other studies. Similarly to previous studies (e.g., Standage et al. 2005), we have found evidence that zero order correlations between intrinsic motivation and well-being variables were positive and zero order correlations between intrinsic motivation and ill-being variables were negative (see Table 2). The direction of these relations changed when basic psychological needs satisfaction was considered into the model as a confounding variable between intrinsic motivation and psychological consequences.

Breslow and Day (1980, p. 95) distinguished between situations in which the addition of a confounding variable to a regression equation reduces the association between an independent and a dependent variable, and those contexts in which the addition increases the association. They term the former positive confounding and the latter negative confounding. Comparison of zero order correlations and structural models shows that associations between intrinsic motivation and well-being variables were positive and significant in zero order correlations, whereas in structural models these associations were reduced, since they became negative or non-significant. Again, as mentioned before, an exception of this occurred with the academic self-esteem, where the significant positive association found in the zero order correlation remained positive and significant in the

structural model. This informs us that, for the majority of well-being variables, basic psychological needs satisfaction functioned as a positive confounder. In contrast to that, associations between intrinsic motivation and ill-being variables were negative and significant in zero order correlations, and turned into positive or non-significant associations in structural models. An exception was the association between intrinsic motivation and depressive symptomatology, which was negative and non-significant and turned into a positive and significant one. In any case, for all ill-being variables an augmentation was found. Consequently, basic psychological needs satisfaction functioned as a negative confounder for ill-being variables.

The confirmation of a confounding effect on the relation between self-determined motivation and psychological consequences is highly relevant to OIT. As we noted earlier, this mini-theory assumes a positive relation between self-determined motivation and psychological health. On one hand, our results suggest that basic psychological needs satisfaction is a confounding variable and, consequently, in order to obtain an undistorted estimation of the relation between self-determined motivation and psychological consequences, this variable has to be added into the model. On the other hand, our results point out that, the beneficial effect that self-determined motivation has on psychological consequences is fully explained by basic psychological needs satisfaction. As a matter of fact, the positive and significant relations between self-determined motivation and well-being variables turned into negative or non-significant ones when they are controlled by basic psychological needs satisfaction, except with academic self-esteem. Symmetrically, the negative and significant relations between self-determined motivation and ill-being variables turned into positive or non-significant ones. In other words, basic psychological needs satisfaction seems to be related to positive psychological consequences, including self-determined motivation. Thus, the real influence of self-determined motivation on psychological consequences, if any, is opposite to it was thought.

Since basic psychological needs satisfaction generally had a negative indirect effect on well-being and a positive indirect effect on ill-being, one may deduce that the satisfaction of basic psychological needs has a detrimental effect on well-being. Indeed, for general self-esteem and social self-esteem the indirect effect of basic psychological needs satisfaction was statistically negative, whereas for loneliness was statistically positive (see Table 4). None the less, this is not true since the total effect that basic psychological needs satisfaction had on psychological consequences was positive for well-being variables and negative for ill-being variables (see Table 2 that provides zero order correlations between latent variables, which are equivalent to total effects).

As mentioned earlier, the indirect effect of basic psychological needs satisfaction on psychological consequences through the mediation of self-determined motivation was not confirmed in most of the psychological variables. Apparently, these results stand in contradiction to HMIEM, since this model predicts this indirect effect. However, the lack of the expected indirect effect is not necessary contrary to HMIEM. As mentioned previously, HMIEM considers three levels of motivation (situational, contextual and global) and it predicts this indirect effect within each level of motivation. In this study all the psychological consequences were measured at different level from both the satisfaction of basic psychological needs and self-determined motivation; an exception was academic motivation. Therefore, our study cannot evaluate properly HMIEM. In fact, when all variables were measured at the same level (at contextual level), HMIEM is confirmed. However, although the sequence of motivational processes put forward by HMIEM is established within each level, HMIEM also considers reciprocal effects (top-down and bottom-up effects) between the levels. Concretely, it is stated that these

reciprocal effects occur between motivation and consequences at different levels (Corollary 3.3 and Corollary 5.2, respectively). Therefore, HMIEM leaves open the possibility that the sequence of motivational processes could be generalized to other levels.

One may believe that to evaluate effects between levels it is necessary to estimate all the relations between the components involved in the sequence of motivational processes. Thus, for instance, to evaluate the effect of intrinsic motivation at contextual level on an outcome at global level, it would be necessary to estimate, first, the path coefficient between intrinsic motivation at contextual level and intrinsic motivation at global level and, finally, the path coefficient between intrinsic motivation at global level and outcome at global level. However, there are studies that have found evidence in favor of generality between levels just estimating the relation between motivation at contextual level and on outcome at global level. For example, Ratelle et al. (2005) have found that school-leisure conflicts mediate the relation between leisure and school motivation (contextual motivation) and depression, as well as satisfaction with life (consequences at global level). The zero order correlation found in this study between academic motivation (contextual motivation) and depression (consequence at global level) was negative and significant. Contrarily, the zero order correlation between academic motivation (contextual motivation) and life satisfaction (consequence at global level) was positive and significant. Other authors have also confirmed this positive and significant zero order correlation between academic motivation and life satisfaction with Jordan students (Hamdan-Mansour et al. 2015), as well as with British and Ecuadorian students (Bryja 2012). Finally, Balaguer et al. (2008) have confirmed the sequence of motivational processes proposed by HMIEM when, as in our study, basic psychological needs and intrinsic motivation was measured at contextual level (specifically, in sport context), whereas consequences were measured at global level (using self-worth and satisfaction with life as variables). In contrast to these results, ours results did not find generalization of the sequence of motivational processes between levels. The reason of the discrepancy between our results and previous ones may lay in that previous ones did not control the influence of basic needs satisfaction on psychological consequence. In any case, further research is necessary to determine the generality of the sequence of motivational processes between levels.

Focusing in our study, there must be a reason why confirmation of the sequence of motivational processes depends on whether components are measured at the same or at different levels. We speculate that self-determined motivated may have both positive and negative effects on well-being. Specifically, academic self-determined motivated students may dedicate more time to study than to relate to their friends comparatively to less self-determined motivated students. A positive consequence of this is that this would increase academic self-esteem (a consequence that is at the same level than motivation), whereas a negative consequence is that this would reduce satisfaction with their social life. This negative effect on social life would be manifested on greater feelings of loneliness and a reduction of social self-esteem (consequences that are at different level from that of motivation). Likewise, since social life is an essential aspect of general well-being, general well-being would be affected, which would be reflected on an augmentation of depressive symptomatology and a reduction of general self-esteem (which are also consequences that are at different level from that of motivation).

4.1 Limitations and Further Research Directions

This study was not experimental in design, so causation cannot be inferred. More concretely, our study is a survey design that uses cross-sectional data. This may be viewed as problematic, since they do not allow identifying the causal directionality. However, the directionality of the effects in this study is a minor concern because the directionality of evaluated models was theoretical driven. Furthermore, the directionality proposed by the theories considered in this study has been supported by some experimental studies. In spite of all this, it is important to recognize that cross-sectional tests of mediation may yield statistical bias, whose magnitude may be large. Thus, cross-sectional tests may find evidence of mediation when mediation does not exist, or do not find evidence for mediation when mediation exists (Maxwell and Cole 2007; Maxwell et al. 2011). Longitudinal mediation analyses may avoid this statistical bias. For this reason, it would be interesting to undertake a similar study with longitudinal data to verify our findings.

The present work, to our knowledge, is the first one to evaluate the confounding role of basic psychological needs satisfaction. Therefore, future research should assess the replicability of this finding. In addition to that, future research could examine the hypothesis that self-determined motivation could have a detrimental effect on general well-being by negatively affecting social life. In the matter of the type of the consequences, our work has been limited to the study of psychological consequences. Consequently, future research should try to determine the generality of this finding by investigating with other consequences, such as academic performance and persistence. We expect that self-determined academic motivated students would dedicate more time and effort to study than to enjoy the company of their friends. This would deteriorate their social life, which would make them feel less happy, respective to less self-determined motivated students. However, in return, self-determined academic motivated students would obtain better marks and should have fewer dropouts. Finally, our study is restricted to an educational context and to an adolescent population. Further research should also evaluate the generality of our results in different contexts and with different populations.

5 Conclusion

On one hand, basic psychological needs satisfaction may function as a confounding variable between self-determined motivation and psychological consequences. On the other hand, the sign of the relation between self-determined motivation and well-being, when adjusted by the effect of the basic psychological needs satisfaction, depended on the level in which motivation and well-being were measured. When motivation and well-being were measured at different levels, the relation was negative or null. However, when they were at the same level, the relation was positive. Finally, although, in general, indirect effects of basic psychological needs satisfaction on psychological consequences was detrimental or null, the overall effect of basic psychological needs satisfaction on psychological consequences was always beneficial.

Compliance with Ethical Standards

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