TITLE: How do curiosity, meaning in life, and search for meaning predict college students' daily emotional exhaustion and engagement?

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Abstract

College students face numerous academic demands on a daily basis. The resources of the University and of the students to cope with these demands are essential to explain students' levels of well-being. The purpose of this investigation is to explore the role of day-level curiosity and meaning in life in the explanation of students' levels of engagement and emotional exhaustion at night. Two-hundred and nine college students participated in a daily study of five consecutive academic days, completing measures of curiosity and meaning in life in the afternoon and measures of engagement and emotional exhaustion at night. Data were analyzed using MLwiN software from a hierarchical linear modeling and daily approach. Curiosity in the afternoon showed a positive relationship with levels of engagement at night, and a negative relationship with levels of emotional exhaustion at night. Moreover, the interaction of curiosity and search for meaning and emotional exhaustion was positive. Although curiosity drives to exploring opportunities and challenges, decreases exhaustion and promotes daily engagement, when curiosity interacts with other emotional loads, (such as search for meaning), it can become an emotional overload favoring exhaustion. From this perspective, it is necessary to continue investigating the mechanisms that predict students' well-being and to create academic environments that stimulate curiosity and support students in their search for meaning in life.

Keywords: meaning in life, curiosity, engagement, emotional exhaustion, daily study

How do curiosity, meaning in life, and search for meaning predict college students' daily emotional exhaustion and engagement?

Entering the university provides new opportunities, challenges, and difficulties to those students who gain access. During this time, students must not only deal with the classic academic tasks, but are also immersed in building and discovering new relationships, meanings, and human values. The way in which students approach this period and novel context may be a key element in predicting their behaviors, attitudes, and feelings with regard to their studies and commitment. From this perspective, it is pertinent to study in depth students' personal characteristics that lead to the formation of individuals who are committed to, satisfied with, and motivated by their studies (Schreiner et al. 2009).

Students' levels of motivation towards and satisfaction with their studies may be reflected in their levels engagement and emotional exhaustion (Schaufeli et al. 2002). Although the study of both constructs proceeds from the analysis of professional samples, various relevant investigations corroborate that students can either feel emotionally exhausted and fatigued or profoundly engaged in their studies (Salanova et al. 2000; Salanova et al. 2003; Salanova et al. 2010; Salmela-Aro & Upadaya 2012; Schaufeli et al. 2002).

Specifically, engagement was initially defined as a positive, fulfilling, and affective-motivational state of work-related well-being that is characterized by vigor, dedication, and absorption (Schaufeli et al. 2002). Highly engaged individuals reflect high levels of energy, persistence, and effort in their activities, despite setbacks and difficulties (vigor), they show high levels of involvement, enthusiasm, inspiration, pride, and challenge in their tasks (dedication), and they are capable of maintaining high levels of concentration and involvement during their tasks (absorption) (Schaufeli et al. 2002). Students' engagement can positively predict their levels of performance and commitment, helping them to persist and feel more involved in their activities and obtain better academic outcomes (Salanova et al. 2003; Salanova et al. 2005; Schaufeli et al. 2002). In contrast, emotional exhaustion reflects feelings of tension and chronic fatigue as a result of an overload derived from academic demands and a lack of emotional resources (Salmela-Aro et al. 2009). Due to emotional exhaustion, students persist less and abandon their tasks more easily, and as a result, their academic outcomes may be worse, outcomes that may negatively influence their personal well-being (Law 2007; Taris 2006).

Scientific literature shows that students' levels of engagement and emotional exhaustion reflect a dynamic process that is susceptible to fluctuations depending on certain variations in environmental and

personal factors (Alarcon et al. 2011; Bakker et al. 2014; Jacobs & Dodd 2003). However, most of the works that analyze the above-mentioned variables in students are cross-sectional studies, which cannot show how the daily variation of certain personal or environmental variables can also predict daily levels of engagement or emotional exhaustion. For example, Bakker, Sanz-Vergel, and Kuntze (2014) recently published a work in which they analyzed the positive impact of weekly personal variables (i.e., self-efficacy, optimism, and self-esteem) on weekly engagement and active learning. The results of their study showed how students' weekly psychological resources facilitated their study engagement. Moreover, they showed that these processes are different for those who are low versus high in openness to experience; that is to say, students who were generally broad-minded and intellectually curious profited more from the weekly resources that were available in their study environment.

In the present study, we will explore daily variations in engagement and emotional exhaustion at night in students, based on their strengths (curiosity and meaning in life) and daily fluctuations. Specifically, we will examine the role of daily meaning in life and daily curiosity in the afternoon on students' daily levels of engagement and emotional exhaustion at night. The variables meaning in life and curiosity are very closely connected to human well-being and motivation (Arnone et al. 2011; Kashdan & Steger 2007; King et al. 2006), and some recent works from the area of organizations and work have revealed their relationship with work engagement and emotional exhaustion (Garrosa et al. 2013; Van den Heuvel et al. 2009; Wang & Li 2015). For example, Wang and Li proposed that curiosity is negatively associated with worker's emotional exhaustion. On the other hand, Van den Heuvel et al. (2009) showed that meaning in life was the predictor most strongly related to work engagement in a sample of workers. Yet the possible influence of meaning in life and curiosity on students' engagement and emotional exhaustion is still relatively underexplored. On the basis of this recent line of research, we think that students' meaning in life and curiosity could also be good predictors of their levels of academic engagement and emotional exhaustion at the daily level.

This study contributes to research in various ways. Firstly, we add to the limited number of studies examining students' daily levels of engagement and emotional exhaustion and how these levels fluctuate based on students' daily meaning in life and curiosity. Secondly, to show the dynamic role of curiosity, we also explored its moderating role between meaning in life and the consequences for students' engagement and emotional exhaustion. Although this relationship has not yet been sufficiently explored, curiosity and meaning in life are related to each other in the explanation of people's well-being (Kashdan

& Steger 2007), and some studies highlight the importance of basic personality dispositions closer to the concept of curiosity (e.g., Openness and Approach Orientation) to understand meaning in life and its correlates (Steger et al. 2008).

Meaning in life, engagement, and emotional exhaustion

Meaning in life refers to the extent to which people comprehend, make sense of, or see significance in their lives, accompanied by the degree to which they perceive themselves to have a purpose, mission, or overarching aim in life (Steger 2009). Meaning in life is often approached as a broad concept containing cognitive components (e.g., the understanding of who we are), motivational goal-directed components (e.g., the identification and pursuit of purpose), and affective components (e.g., a feeling that life makes sense). It has been studied as a disposition, but also as a state with possible daily variations in time (Steger & Frazier 2005; Steger & Kashdan 2013). People who experience meaning in life present higher self-esteem (Steger et al. 2006), better health (Steger et al. 2014), more adaptive psychosocial functioning (Dezutter et al. 2014), work engagement (Van den Heuvel et al. 2009), and positive emotions, both in general and at the daily level (Garrosa et al. 2013; King et al. 2006; Steger & Kashdan 2013). These results can be explained due to the fact that meaning in life may act as an impetus for people to invest in their lives (Ryff & Singer 1998*;* Steger, 2009), providing powerful motivation to maintain health. Moreover, meaning in life fosters a more optimistic orientation towards life and this, in turn, facilitates physiological functioning by reducing perceptions of and reactions to threat (Ryff & Singer, 1998).

Meaning in life could play a positive role in students' engagement and emotional exhaustion. This association has been recently revealed in studies with working populations (Garrosa et al. 2013; Van den Heuvel et al. 2009) and could be explained by various mechanisms. Firstly, the cognitive, motivational goal-directed, and affective components that constitute meaning in life (i.e., the understanding of who we are, the identification and pursuit of purpose, and a feeling that life makes sense) should facilitate college students' abilities and attitudes to invest in their academic activities and engage more fully. Moreover, as mentioned above, meaning in life acts as an impetus for people to invest in their lives (Ryff & Singer 1998*;* Steger, 2009), which could be related to a higher level of academic engagement. However, meaning in life is also related to feelings of self-confidence and control, it facilitates adjustment to changes and is associated with fewer negative affective states, which could lead to lower levels of emotional exhaustion (Garrosa et al. 2013; Wong 2012; Van den Heuvel et al. 2009).

Contemporary researchers of meaning in life study its possible benefits from a day-level perspective to determine the mechanisms involved in the creation of meaning and its relation to well-being (Steger & Kashdan 2013). For example, it has been observed that daily variations of meaning in life predict affect at night (Garrosa et al. 2013). Thus, on the basis of the arguments and literature presented herein, we think that students' meaning in life could be a good predictor of their levels of academic engagement and emotional exhaustion at the daily level.

The study of meaning in life has also addressed the consequences of its lack and the search for meaning on individuals' well-being (Debats et al. 1993). The absence of meaning could stimulate a person to perform a series of behaviors to search for it (Klinger 1998). In this sense, search for meaning is an essential motivation of human beings (Frankl 1963), and it has been defined as "the strength, intensity, and activity of people's desire and efforts to establish and/or augment their understanding of the meaning, significance, and purpose of their lives" (Steger et al. 2009, p. 200). Research has shown how motivation to search for meaning can arise mainly from two sources: (a) as an adaptive way to cope with different life circumstances through personal growth and the discovery of new opportunities and challenges (Bronk et al. 2009; Frankl 1963); or (b) as the expression of a personal and existential frustration because personal needs were not adequately satisfied (Baumeister 1991). Although people need to understand their experience and identify their life goals, those searching for meaning in life commonly feel more discrepancies when comparing their real life to their desired life. Steger et al. (2006) showed that people searching for meaning in life are unhappier about their past and present and more open to discovering and understanding the world around them. Nevertheless, some research shows that the positive associations between search for meaning and lack of well-being may differ according to different cultures. Specifically, in collectivistic cultures, search for meaning could be positively related to mental health (Datu et al. 2015). However, in Western and individualistic societies, search for meaning has been related to lower life satisfaction (Steger et al. 2011), lower psychological well-being (Steger et al. 2008), lower control over one's environment and to feelings of dissatisfaction with oneself and with one's personal relationships (Steger et al. 2008). In this sense, we think that search for meaning could have a negative relation with students' engagement and emotional exhaustion. According to the existential perspective of burnout, the root cause of emotional exhaustion lies in people's need to believe that their lives and jobs are meaningful; that the things they do are useful and important (Pines 1993). When they feel that they have failed, that their lives or jobs are insignificant, that they make no difference in the world, they start

feeling helpless and hopeless and eventually suffer from burnout and disengagement (Aktouf 1992; Kahn 1990; May et al. 2004). Drawing on these arguments, we think that students' search for meaning could also be related to their levels of academic engagement and emotional exhaustion at the daily level.

Curiosity, engagement, and emotional exhaustion

Curiosity is an appetitive state involving the recognition, pursuit, and intense desire to investigate novel information and experiences that demand one's attention (Kashdan & Steger 2007). In the modern era, the notion of curiosity as a source of intrinsic motivation is prevalent in most areas of psychology (Ryan & Deci 2000; Silvia 2012). From this perspective, curiosity motivates people to explore and learn for their own sakes.

Curiosity has also been considered one of the main mechanisms of individuals' biological reward system (Depue 1996), with an important impact on human well-being (Brdar & Kashdan 2010; Park et al. 2004). It has been related to the presence of positive emotions, energy, and vitality (Ryan & Frederick 1997) and to higher identification with and commitment to activities concerning growth and development (Kashdan & Steger 2007). It has also been shown to predict beneficial outcomes within an academic context, where it has been confirmed that students with high levels of curiosity achieve higher levels of learning, performance, and engagement in academic tasks (Harackiewicz et al. 2002; Hidi & Berndorff 1998; Kashdan & Yuen 2007). In addition, curiosity facilitates persistence in one's goals (Thoman, Smith, & Silvia 2011). Curious individuals show greater daily interest, which allows them to expand their knowledge, skills, and goal-directed efforts (Ainley et al. 2002; Silvia 2008). On the basis of these findings, we think that curiosity could play a positive role in students' engagement and emotional exhaustion. This positive role could be explained by several mechanisms. On the one hand, curiosity is a source of intrinsic motivation involving the tendency to explore the environment and focus attention on activities that facilitate learning, competence, and self-determination (Deci & Ryan 1987; Kashdan et al. 2004; Silvia 2012). This could indicate that curiosity facilitates curious students' experience of higher levels of engagement (Deci & Ryan 1987; Hulme, Green, & Ladd 2013; Silvia 2012). Moreover, curiosity provides a better distribution of attention and energy to identify and follow signs of challenge; it allows behavioral exploration of challenging activities; and it leads to deep engagement and absorption in these activities (Kashdan 2004), which can also play a positive role in students' engagement. It should be noted that curiosity and engagement are different constructs. Although both of them are affective and motivational constructs, the former refers to a personal orientation that leads to active behaviors, whereas

the latter is a measure of well-being (Arnone et al. 2011; Ouweneel et al. 2012). Although curiosity is common among highly engaged students (Hulme et al. 2013), some individuals may be curious but may not necessarily engage in their roles or activities due to other external or internal factors.

On the other hand, curiosity could play a protective role against emotional exhaustion because people with a high level of curiosity are more likely to experience positive emotions and energy (Kashdan & Steger 2007; Ryan & Frederick 1997), which in turn, reduce their states of emotional exhaustion. Moreover, curiosity helps people to adapt better to environments (Harrison et al. 2011; Savickas 1997). For example, Wang and Li (2015) proposed that curiosity contributes to the enhancement of personal initiative at work, which in turn improves workers' psychological well-being and alleviates their states of emotional exhaustion.

The present study

The present study examines how students' daily levels of engagement and emotional exhaustion can fluctuate based on their daily levels of meaning in life and curiosity. To date, most of the works that analyze the above-mentioned variables in students are cross-sectional studies, with the resulting limitation due to the variance of the common method, as well as the consequences of within-subject variability and the systematic assumption of the stability of personal variables, which is also a source of bias. Hence, in this study, we used a diary methodology, involving multiple measures of the participants within a certain time interval and in a setting that was nearer to the prediction of daily life and in which we could observe personal variability. Using a diary design implies observing, on the one hand, whether individuals' levels of well-being fluctuate across days and, on the other hand, determining the source of these variations. Specifically, on the basis of all the arguments presented in the introduction section, we hypothesized that:

Hypothesis 1: Day-level curiosity in the afternoon will be positively related to (1a) engagement at night, and (1b) negatively related to emotional exhaustion at night.

Hypothesis 2: Day-level meaning in life in the afternoon will be positively related to (2a) engagement at night, and (2b) negatively related to emotional exhaustion at night.

Hypothesis 3: Day-level search for meaning in the afternoon will be positively related to (3a) emotional exhaustion at night, and (3b) negatively related to engagement at night.

In addition, in this study, we will analyze the moderating role of curiosity in the relationship between meaning in life and students' engagement and emotional exhaustion. We proposed the following hypotheses (*see Figure 1*):

Hypothesis 4: Day-level curiosity in the afternoon will moderate (4a) the relation between presence of meaning and engagement at night and (4b) the relation between presence of meaning and emotional exhaustion at night. That is to say, for persons with high levels of day-level curiosity in the afternoon, the relationship between presence of meaning and engagement at night will be stronger, and the inverse relationship between presence of meaning and emotional exhaustion at night will be weaker relative to persons with low levels of day-level curiosity in the afternoon.

Hypothesis 5: Day-level curiosity in the afternoon will (5a) positively moderate the relation between search for meaning and engagement at night and (5b) negatively moderate the relation between search for meaning and emotional exhaustion at night. That is to say, for persons with high levels of day-level curiosity in the afternoon, the relationship between search for meaning and engagement at night will be stronger, and the inverse relationship between presence of meaning and emotional exhaustion at night will be weaker relative to persons with low levels of day-level curiosity in the afternoon.

Insert figure 1

This moderation effect could be explained by two mechanisms. Firstly, as mentioned above, curiosity is a human strength that helps people to foster well-being (e.g., vitality, positive emotions) and motivational states (e.g., higher levels of learning, performance, and engagement in academic tasks). In this sense, curiosity may favor students who show lack of meaning in life or who are searching for meaning in life in the afternoon, enabling them to come into contact with a broader array of novel, positive, and challenging experiences that would increase their levels of engagement at night and reduce their levels of emotional exhaustion (Hulme et al. 2013). Secondly, students with high levels of curiosity tend to be more tolerant of ambiguity and to perceive difficulties as opportunities rather than as threats (Kashdan 2009). They embrace the uncertain aspect of life and tend not to be deterred by a lack of understanding or meaning of the experience. They even describe the discovery of meaning as "following their passions" (Hulme et al. 2013). In this sense, students' curiosity could help to reduce the negative consequences of lack of meaning and the search for meaning on engagement and emotional exhaustion. Although other variables related to curiosity (e.g., mental openness or the motivational approach-avoidance system) have been shown to predict these associations, to our knowledge, curiosity has not been explored until now in this relationship (Steger et al. 2008).

Method

Sample and Procedure

We collected data from 209 undergraduate Psychology students from a higher education institution from Madrid, Spain. Most of them were female (81.8%) with a mean age of 19.61 (*SD* = 1.74). They received a package that included: (a) a letter describing the objective of the study and assuring anonymity and confidentiality, (b) instructions about the completion of the surveys, and (c) the general and daily questionnaire. They filled in the general questionnaire (Level 2, Person-level) and, subsequently, they completed daily questionnaires (Level 1, Day-level) three times a day (in the morning, in the afternoon, and at night) for five consecutive university-class days from Monday to Friday. To guarantee confidentiality, responses were related to anonymous codes provided by the participants.

We calculated the required sample size (a priori power analysis) for regression analysis (random model) considering R^2 = .15, number of predictors = 10, statistical power level = .80, and probability level = .05 by G*Power 3.1 (Faul et al. 2009). We obtained the minimum required sample size of 153 participants. Therefore, the present sample size (*N* = 209) provides sufficient power (i.e., above .80) to produce statistically significant results. Participants were recruited through in-class announcements. Researchers informed students that they could hand in the questionnaires after two weeks. They were given a reminder in class about the importance of completing them on a daily basis. We could also count on the collaboration of professors from different classes to promote participation in the study.

We collected the data with the same general and daily paper-based questionnaires, including the appropriate instructions for the time of day and university context of the sample. Specifically, we assessed sleep quality and affect in the morning as control variables; meaning in life and curiosity were measured in the afternoon; and engagement and emotional exhaustion were reported at night. We decided that these time intervals were the most appropriate to measure our variables because, when diary researchers choose interval response schedules, they must decide what time frame is likely to reveal pertinent dynamic processes (Bolger et al. 2003). In this sense and in accordance with our study design, we think that any psychological aspect related to curiosity and meaning in life (our predictor variables) is more likely to appear in the afternoon instead of in the morning (just after getting up) or in the evening (before going to bed). On the other hand, in diary studies, outcome variables are usually measured after predictor variables (generally at bedtime) in order to reduce common method variance (Garrosa et al. 2013; Podsakoff et al. 2003; Sanz-Vergel et al. 2010). In this study, the time of answering daily surveys was also recorded. The average time when participants responded to the morning survey was 8:33 a.m. (*SD* = 1 hour), the

average time when they responded to the afternoon form was 18:18 p.m. (*SD* = 43 minutes), and the average time when they completed the evening form was 23:04 p.m. (*SD* = 1 hours 11 minutes).

Measures

Daily measures of all variables used modifications of items from the corresponding trait-scale, reworded for daily administration. This rewording included a specific focus on the day as the unit of analysis. This method of developing state-level analogs of trait measures has been used successfully in the past (Nezlek 2012). The reliability of the daily measures was examined following recommendations of Raudenbush and Bryk (2002, p. 230).

Meaning in life was measured with The Meaning in Life Questionnaire (MLQ; Steger et al. 2006), rated from 1 (*absolutely untrue*) to 7 (*absolutely true*). With two 5-item subscales, the MLQ measures the presence of and search for meaning in life. The Presence of Meaning subscale assesses cognitive appraisals of whether life is meaningful (e.g., "My life has a clear sense of purpose"), whereas The Search for Meaning subscale assesses general tendencies to actively seek meaning and purpose in life (e.g., "I am always searching for something that makes my life feel significant"). For the daily measure, the items were adapted (i.e., "Today, my life had a clear sense of purpose" or "Today, I was searching for something that made my life feel significant"). The reliability and validity of the scale are well-established in terms of internal consistency (Cronbach's alpha ≥ .82) and construct validity. Moreover, a multitrait-multimethod matrix study provides support for excellent convergent and discriminant validity (Steger et al. 2006).

Curiosity was measured with the Curiosity and Exploration Inventory (CEI; Kashdan et al. 2004), rated from 1 (*strongly disagree*) to 7 (*strongly agree*). The CEI measures two components of curiosity: Exploration, defined as a tendency to seek out novel and challenging experiences (e.g., "I frequently find myself looking for new opportunities to grow as a person"); and Absorption, defined as flow-like engagement in activities that capture one's attention (e.g., "When I am participating in an activity, I tend to get so involved that I lose track of time"). For the daily measure, the items were adapted (i.e., "Today, I found myself looking for new opportunities to grow as a person" or "Today, when I was participating in an activity, I tended to get so involved that I lost track of time"). The reliability and validity of the scale are well-established in terms of internal consistency (Cronbach's alpha ≥ .70) and construct validity (Kashdan et al. 2004).

Positive and negative affect (PA and NA) were measured with the short version of Positive and Negative Affect Schedule (PANAS; Mackinnon et al. 1999), rated from 1 (*very slightly*) to 5 (*extremely*). The 5-item PANAS-PA and 5-item PANAS-NA subscales assess the general tendency to feel activated, positive (e.g., "enthusiastic," or ''happy") and negative emotions (e.g., "angry," or ''nervous"), respectively. Daily affect was measured with the same scale, adapted so that the items referred to the present moment. Example items are: "At this moment, I feel happy" or "At this moment, I feel nervous." The reliability and validity of the scale are well-established in terms of internal consistency (Cronbach's alpha = .78 for PA and .87 for NA) and construct validity (Mackinnon et al. 1999).

Engagement was measured with the short version of The Utrecht Work Engagement Scale (UWES-9; Schaufeli et al. 2006), rated from 1 (*not true at all*) to 6 (*totally true*). The UWES evaluates three components of work engagement: vigor, dedication, and absorption. The scale includes 9 items (e.g., "At my job, I feel strong and vigorous," or "I am proud of the work that I do," and "Time flies when I am working"). The rewording included a specific focus on the study context (e.g., "At my studies, I feel strong and vigorous"). Daily engagement was measured with the same scale, adapted so that the items referred to the present moment. An example item is: "At this moment, I feel strong and vigorous with regard to my university activities." The reliability and validity of the scale are well-established in terms of internal consistency (Cronbach's alpha > .80) and construct validity (Schaufeli et al. 2006).

Emotional Exhaustion was measured with The Job-Related Exhaustion Scale (Wharton 1993), rated from 0 (*never felt this way*) to 6 (*felt this way every day*). The scale includes 6 items (e.g., "I feel emotionally drained from my work") measuring the primary dimension of job burnout. We adapted the items to focus on the specific study context (e.g., "I feel emotionally drained from my studies"). Daily exhaustion was measured with the same scale, adapted so that the items referred to the present moment. An example item is: "At this moment, I feel emotionally drained from my studies." The reliability and validity of the scale are well-established in terms of internal consistency (Cronbach's alpha = .87) and construct validity (Wharton 1993).

Control variables at the person-level (Level 2). We assessed gender and the trait criterion variable in the general questionnaire following the methodology recommended in prior studies (Demerouti et al. 2010; Garrosa et al. 2013; Sanz-Vergel et al. 2010).

Control variables at the day-level (Level 1). We gathered day-level affect (i.e., PA and NA in the morning) and sleep quality data in the morning survey by asking participants how they had slept last night, rated from 1 (*very bad*) to 6 (*very good*) (Garrosa et al. 2013; Sanz-Vergel et al. 2010).

Data analysis

For hierarchically structured data like in the present study, the most appropriate approach is multilevel analysis, which has been commonly known as hierarchical linear modeling (Nezlek 2012). Our data set is composed of two levels, with repeated measurements at the day-level or Level 1 (i.e., daily meaning in life, daily search for meaning, daily curiosity, daily engagement, and daily emotional exhaustion), and measurements at the person-level or Level 2 (i.e., sleep quality, trait engagement, and trait emotional exhaustion). Following Ohly, Sonnentag, Niessen, and Zapf (2010), we centered predictor variables at the person level around the grand mean, and predictor variables at the day level around the respective person mean. Interpretations of our results based on stable differences between persons can be ruled out because we used person-level variables as control variables before entering day-level variables in subsequent models of analysis (Nezlek 2012). Data was analyzed using MLwiN 2.28 software.

Results

Descriptive and preliminary analyses

Table 1 shows the means, standard deviations, intraclass-correlations, reliability of day-level and general measures, and bivariate correlations among all the study variables. Before testing our hypotheses, we examined whether our variables vary within persons using the intraclass correlation. The intraclass correlation measures are calculated through the ratio between the Level-2 variance component and the sum of the Level-2 and Level-1 components. When calculating the intraclass coefficient, it was observed that 67.6% [.552/(.552 + .264) = .676] of the variance in engagement at night can be explained by differences between persons. The remaining 32.4% of the variation in engagement at night can be explained by differences within persons. In the case of emotional exhaustion at night, 69.4% of its variance [1.201/(1.201 + .529) = .694] can be explained by differences between persons, and the remaining 30.6% by differences within persons. All predictor variables showed an intra-class correlation coefficient above 25% (Hox & Roberts 2011), except for Search for meaning in life (15%). Overall, these findings suggest that a substantial portion of the variance in our outcome variables can be attributed to within-person variation across the 5 days, which supports the usage of multilevel analysis (Fisher & To 2012).

Insert Table 1

Hypothesis Testing

To test our hypotheses, we added four nested hierarchical linear models, which included the specific general and daily variables. We started with an intercept-only model (null model). In Model 1, we entered person-level control variables (gender, sleep quality, and trait outcome variable). In Model 2, we included day-level control variables (positive and negative affect in the morning). In Model 3, we added daily curiosity and meaning in life variables, which were evaluated in the afternoon. In Model 4, we included the two interaction terms of the predictor variables and curiosity to test the moderator hypotheses. To assess the improvement of each model over the previous one, we examined the difference between the respective likelihood ratios. Tables 2 and 3 display model fit information (difference of -2 x Log), estimates for the fixed parameters, and estimates for the variance components. As a measure of effect size, we computed pseudo-R^2, following the recommendations of Singer and Willet (2003, pp. 102-104). The pseudo-R^2 statistic is used to quantify the incremental variance in the dependent variable that is predicted by adding a new set of predictors to a given model.

Engagement at night

For engagement at night as an outcome variable (see Table 2), Model 3 provided the best model fit, with the positive role of curiosity (B = .207, SE = .039; t = 5.30, p < .001) contributing to an increased model fit (difference of -2 x log = 33.992, df = 3, p < .001), in line with Hypothesis 1a. However, Hypotheses 2a and 3b were not supported. Thus, on days when curiosity in the afternoon is high, students feel more engagement at night, but the same did not occur in the case of high presence of or low search for meaning. Moreover, as we can see in Table 2, Model 4 did not increase model fit, and a nonsignificant interaction was found. Hence, and contrary to Hypotheses 4a and 5a, day-level curiosity in the afternoon did not moderate the relation between meaning in life and engagement at night. With regard to pseudo-R^2, all the predictor and control variables entered in the models explained 6.4% of the variance at Level 2 [.264 – (.247/.264) = .064] and 42% of the variance at Level 1 [.552 – (.320/.552) = .420].

Insert Table 2

Emotional Exhaustion at night

In the case of emotional exhaustion at night, Model 3 provided the best model fit, with the negative role of curiosity (B = -.204, SE = .056; t = -3.64, p < .001) contributing to an increased model fit

(difference of -2 x log = 20.517, $df = 3$, $p < .001$), according to Hypothesis 1b. However, Hypotheses 2b and 3a were not supported. Thus, on days when curiosity in the afternoon is high, students feel lower levels of emotional exhaustion at night. Model 4 added the two interaction terms and increased the model fit (difference of -2 x log = 6.050, $df = 2$, $p < .05$). Moreover, as we can see in Table 3, there was a significant interaction between search for meaning and curiosity in the afternoon and emotional exhaustion at night ($B = -.204$, $SE = .083$; $t = 2.45$, $p < .05$), in accordance with Hypothesis 5b. To better explore the pattern of the interaction, we followed the procedure proposed by Aiken and West (1991). For the significant moderation (see Figure 2), we conducted simple slope tests (Preacher et al. 2006). Simple slope tests showed that search for meaning in the afternoon was more positively related to emotional exhaustion at night on days when curiosity in the afternoon was high ($\gamma = -.249$, $SE = .023$, $z = -10.72$, $p < .001$), whereas it was more negatively related on days when curiosity in the afternoon was low ($\gamma = -.147$, $SE = .072$, $z = -2.03$, $p < .05$). With regard to pseudo-R^2, all the predictor and control variables entered in the models explained 4.9% of the variance at Level 2 [.529 – (.503/.529) = .049] and 26.8% of the variance at Level 1 [1.201 –(.879/1.201) = .268].

Insert Table 3

Insert Figure 2

Discussion

The present study investigated students' daily engagement and emotional exhaustion and their fluctuations in these variables based on their daily levels of meaning in life and curiosity. Moreover, we explored the moderating role of curiosity between meaning in life and the consequences of students' engagement and emotional exhaustion, aspects that until now have not been sufficiently explored and that could play an important role in college students' development and academic commitment (Schreiner et al. 2009; Worrell 2014). In this sense, our study extends previous research by showing the potential positive role of daily meaning in life and curiosity in enhancing motivation and well-being in an academic setting (Kashdan & Steger 2007; Kashdan & Yuen 2007).

A clear contribution of the present research is that, on days when students have higher levels of curiosity in the afternoon, they have higher levels of engagement and lower levels of emotional exhaustion at night. These relationships can be due to the fact that curiosity is a source of intrinsic motivation that involves the tendency to explore the environment, focusing attention on activities that

facilitate learning, competence, and self-determination, leading to a deep engagement with and absorption in these activities (Deci & Ryan 1987; Kashdan et al. 2004; Kashdan 2004; Silvia 2012). This could facilitate curious students' experiencing higher levels of engagement (Deci & Ryan 1987; Silvia 2012). On the other hand, curiosity could be negatively associated with emotional exhaustion due to the fact that people with a high level of curiosity are more likely to experience positive emotions and energy (Kashdan & Steger 2007; Ryan & Frederick 1997), which, in turn, could reduce their states of emotional exhaustion. Moreover, curiosity helps people to adapt better to environments and contributes to the enhancement of personal initiative, which could reduce emotional exhaustion among students (Harrison et al. 2011; Savickas 1997; Wang & Li 2015). However, we did not find significant relationships among meaning in life, engagement, and emotional exhaustion. It seems that variables related to intrinsic motivation (i.e., curiosity) could predict students' engagement and emotional exhaustion because these variables are more deeply connected to motivational aspects like curiosity (Schaufeli et al. 2002). Specifically, engagement reflects high levels of energy, persistence, and effort in activities, high levels of involvement and challenge, and high levels of concentration during students' performance (Salanova et al. 2003; Salanova et al. 2005; Schaufeli et al. 2002). On the other hand, students with high levels of emotional exhaustion persist less and abandon their tasks more easily (Law 2007; Taris 2006). From this perspective, meaning in life, understood as the degree to which people experience their lives as comprehensible and full of goals and meanings (Steger 2009), does not predict and therefore does not appear to affect their levels of engagement and emotional exhaustion. However, curiosity can become a source of vigor, dedication, and absorption, and it inversely predicts and may inversely affect emotional exhaustion (Bakker et al. 2014; Ryan & Frederick 1997; Wang & Li 2015).

On the other hand, the hypothesis regarding the moderating role of curiosity was partly confirmed, but in the unexpected direction. We hypothesized that curiosity would favor students who are searching for meaning in life in the afternoon, enabling them to come into contact with a broader array of novel, positive, and challenging experiences that would increase their levels of engagement at night and reduce their levels of emotional exhaustion. However, search for meaning was positively related to emotional exhaustion at night in conditions of high curiosity, and negatively related in conditions of low curiosity. In this sense, it is observed that curiosity inversely predicts this aspect of well-being when it interacts with another negative variable (i.e., search for meaning). This unexpected outcome could be explained by the fact that students who show high curiosity and at the same time are seeking a meaning in

life could suffer from overload in their cognitive, emotional, and physical system, and this could affect their well-being in terms of greater emotional exhaustion. This idea would be in line with the findings of some previous works indicating that curiosity can also involve an excess of arousal and be accompanied by negative affectivity. For example, according to Litman (2005), curiosity may be equated with a "need to know," which involves somewhat unpleasant feelings of tension or frustration until it is satisfied. Another possible interpretation is that search for meaning and personal growth among students may be deeply enriching and gratifying at the mid and long term, but it can also be exhausting on a daily basis when considering brief time intervals as a unit of analysis. The benefits of this search for meaning, together with curiosity, might be seen at the long term, so that short-term emotional exhaustion would make sense if students thereby achieve greater long-term benefits in well-being.

Simple slope tests also revealed that, at low levels of search for meaning in the afternoon, students who showed low curiosity reported higher emotional exhaustion at night. However, at high levels of search for meaning, no significant differences in emotional exhaustion emerged between different levels of curiosity. Search for meaning can be motivated by a lack of meaning and by a desire to achieve it (Frankl 1963; Klinger 1998; Steger et al. 2009), which is associated with higher emotional exhaustion (Garrosa et al. 2013; Pines 1993). Among people who are higher in openness and more approach-oriented, search for meaning is more positively related to presence of meaning, because these personal characteristics —like curiosity— reflect an intense desire to investigate novel information and experiences that help one to achieve presence of meaning and well-being and to reduce emotional exhaustion (Steger et al. 2008; Wang & Li 2015). However, a lower search for meaning among people who show lower levels of curiosity may reflect a low desire to investigate novel information and experiences and a low desire to invest energy in daily activities, which can lead to higher levels of emotional exhaustion (Maslach & Jackson 1984; Steger 2009; Wang & Li 2015).

Taken altogether, our findings suggest that curiosity could provide motivation and enhance some aspects of well-being among students in terms of higher levels of engagement and lower levels of emotional exhaustion. Moreover, the results also showed that when curious students do not have to face other emotional and cognitive demand derived from search for meaning, their curiosity inversely predicted emotional exhaustion, suggesting its potential to reduce emotional exhaustion. Additionally, more research about meaning in life with daily methodology is recommended to understand this complex and interactive relationship.

Limitations and Suggestions for Future Research

The current study has some limitations. Firstly, we assessed all data with self-report measures, raising concerns about common-method variance. However, by using person-centered scores in the analyses, we eliminated the potential influence of response tendencies stemming from individual differences, and we thereby reduced the problems associated with common-method variance. In addition, multi-level analysis takes into account interdependence between measurements, and we controlled for trait engagement and trait emotional exhaustion in the analyses. Secondly, we measured curiosity and meaning in life in the afternoon, and engagement and emotional exhaustion at night. Although we cannot guarantee that nothing occurs (i.e., any confounding events or variables) between the afternoon and nighttime, this methodological process tries to minimize the problem of common method variance by temporally separating predictor and outcome variables (Podsakoff et al. 2003). Thirdly, our sample included more than 80% of females, a gender that is habitually overrepresented in Psychology degree studies. Although a Student *t*-test for independent groups showed that there were no significant differences between males and females in any variables of this study, this gender imbalance limits our ability to generalize these findings to male populations. For example, one might think that the negative influence of search for meaning on well-being could vary among females or males. Nevertheless, after a detailed review of the available literature, we did not find any work that reports gender-based differences in search for meaning and its correlates. Moreover, by controlling for the "gender" variable in our analysis, we ruled out some potential bias. Nevertheless, future studies should try to replicate the results with a more balanced sample. Finally, we cannot draw conclusions about causal relations among our variables. Experimental studies or intervention studies manipulating curiosity are needed to confirm the causal links.

Practical implications and conclusions

Our diary study has shown that there is substantial variability in students' curiosity, engagement, and emotional exhaustion. These results have important applications in the academic context with regard to the role of curiosity as a variable that promotes students' motivation and well-being in terms of higher engagement and lower emotional exhaustion (Hulme at al. 2013). From this viewpoint, the academic context should offer the possibility of programs to increase personal resources, such as curiosity, and should generate a stimulating teaching environment where research, innovation, and openness to experience lead to new learning opportunities and personal development. Curiosity in educational settings

can be aroused and sustained in ways that also promote attention (gaining and maintaining students' attention), relevance (demonstrating the relevance of the learning experiences), confidence (building students' confidence in their competence in the learning task), and learning satisfaction (Arnone & Small 2013, p. 132). In this sense, educators should ensure that all students are prepared to resolve their curiosity-related issues through the use of inquiry skills, and they should create learning environments that encourage exploration and discovery. Colleges and universities also can produce greater levels of curiosity in students by challenging them to conceptualize failure as a valuable part of the learning process that allows them to experience uncertainty by not providing quick solutions to problems, orients them to the role of curiosity in the college experiences, and develops an emphasis on discovering a sense of meaning in life.

References

Ainley, M., Hidi, S., & Berndorff, D. (2002). Interest, learning, and the psychological processes that mediate their relationship. *Journal of Educational Psychology*, doi:10.1037/0022-0663.94.3.545

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage Publications.

Aktouf, O. (1992). Management and theories of organizations in the 1990s: Toward a critical radical humanism. *Academy of Management Review*, doi:10.2307/258717

Alarcon, G. M., Edwards, J. M., & Menke, L. E. (2011). Student burnout and engagement: A test of the conservation of resources theory. *Journal of Psychology: Interdisciplinary and Applied*, doi:10.1080/00223980.2011.555432

Arnone, M. P., Small, R. V., Chauncey, S. A., & McKenna, H. P. (2011). Curiosity, interest and engagement in technology-pervasive learning environments: A new research agenda. *Educational Technology Research and Development*, doi:10.1007/s11423-011-9190-9

Baumeister, R. F. (1991). *Meanings of life*. New York: Guilford Press.

Bakker, A. B., Sanz Vergel, A. I., & Kuntze, J. (2015). Student engagement and performance: A weekly diary study on the role of openness. *Motivation and Emotion,* doi:10.1007/s11031-014-9422-5

Berlyne, D. E. (1960). *Conflict, arousal, and curiosity*. New York: McGraw-Hill, doi:10.1037/11164-000

Brdar, I., & Kashdan, T. B. (2010). Character strengths and well-being in Croatia: An empirical investigation of structure and correlates. *Journal of Research in Personality*, doi:10.1016/j.jrp.2009.12.001

Bronk, K. C., Hill, P. L., Lapsley, D. K., Talib, T. L., & Finch, H. (2009). Purpose, hope, and life satisfaction in three age groups. *The Journal of Positive Psychology*, doi:10.1080/17439760903271439

Datu, J. A. D. (2015). The synergistic interplay between positive emotions and maximization enhances meaning in life: A study in a collectivist context. *Current Psychology,* doi:10.1007/s12144-015-9314-1

Deci, E. L., & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of Personality & Social Psychology, 53*(6), 1024-1037, doi:10.1037/0022-3514.53.6.1024

Demerouti, E., Cropanzano, R., & Leiter, M. P. (2010). *From thought to action: Employee work engagement and job performance*. New York: Psychology Press.

Depue, R. A. (1996). *A neurobiological framework for the structure of personality and emotion: Implications for personality disorders*. New York: Guilford Press.

Dezutter, J., Waterman, A. S., Schwartz, S. J., Luyckx, K., Beyers, W., Meca, A., …Caraway, J. S. (2014). Meaning in life in emerging adulthood: A person-oriented approach. *Journal of Personality,* doi:10.1111/jopy.12033

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, doi:10.3758/BRM.41.4.1149.

Fisher, C. D., & To, M. L. (2012). Using experience sampling methodology in organizational behavior. *Journal of Organizational Behavior,* doi:10.1002/job.1803

Frankl, V. E. (1963). *Man's search for meaning: An introduction to logotherapy.* New York: Washington Square Press.

Garrosa, E., Carmona-Cobo, I., Ladstätter, F., Blanco, L. M., & Cooper-Thomas, H. D. (2013). The relationships between family-work interaction, job-related exhaustion, detachment, and meaning in life: A day-level study of emotional well-being, *Journal of Work and Organizational Psychology*, doi:10.5093/tr2013a23

Harackiewicz, J. M., Barron, K. E., Tauer, J. M., & Elliot, A. J. (2002). Predicting success in college: A longitudinal study of achievement goals and ability measures as predictors of interest and performance from freshman year through graduation. *Journal of Educational Psychology,* doi:10.1037/0022-0663.94.3.562

Harrison, S. H., Sluss, D. M., & Ashforth, B. E. (2011). Curiosity adapted the cat: The role of trait curiosity in newcomer adaptation. *Journal of Applied Psychology,* doi:10.1037/a0021647

Hidi, S., & Berndorff, D. (1998). Situational interest and learning. In L. Hoffmann, A. Krapp, K. Renninger, & J. Baumert (Eds.), *Interest and learning: Proceedings of the Second Conference on Interest and Gender* (pp. 74-90). Kiel, Germany: IPN.

Hox, J. J., & Roberts, J. K. (2011). *Multilevel analysis: Where we were and where we are*. New York, NY: Routledge/Taylor & Francis Group.

Jacobs, S. R., & Dodd, D. K. (2003). Student burnout as a function of personality, social support, and workload. *Journal of College Student Development*, doi:10.1353/csd.2003.0028

Kashdan, T.B. (2004). Curiosity. In C. Peterson and M.E.P. Seligman, (Ed.), Character strengths and virtues: A handbook and classification (pp. 125-141). Washington, DC: American Psychological Association and Oxford University Press.

Kashdan, T. B., & Roberts, J. E. (2004). Trait and state curiosity in the genesis of intimacy: Differentiation from related constructs. *Journal of Social and Clinical Psychology,* doi:10.1521/jscp.23.6.792.54800

Kashdan, T. B., Rose, P., & Fincham, F. D. (2004). Curiosity and exploration: Facilitating positive subjective experiences and personal growth opportunities. *Journal of Personality Assessment*, doi:10.1207/s15327752jpa8203_05

Kashdan, T. B., & Steger, M. F. (2007). Curiosity and pathways to well-being and meaning in life: Traits, states, and everyday behaviors. *Motivation and Emotion,* doi:10.1007/s11031-007-9068-7

Kashdan, T. B., & Yuen, M. (2007). Whether highly curious students thrive academically depends on perceptions about the school learning environment: A study of Hong Kong adolescents. *Motivation and Emotion,* doi:10.1007/s11031-007-9074-9

Kahn, W.A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal,* doi:10.2307/256287

King, L. A., Hicks, J. A., Krull, J. L., & Del Gaiso, A. K. (2006). Positive affect and the experience of meaning in life. *Journal of Personality and Social Psychology,* doi:10.1037/0022-3514.90.1.179

Klinger, E. (1998). *The search for meaning in evolutionary perspective and its clinical implications*. Mahwah, NJ: Erlbaum.

Law, D. W. (2007). Exhaustion in university students and the effect of coursework involvement. *Journal of American College Health*, doi:10.3200/JACH.55.4.239-245

Litman, J. (2005). Curiosity and the pleasures of learning: Wanting and liking new information. *Cognition & Emotion*, doi:10.1080/02699930541000101

Litman, J. A., & Jimerson, T. L. (2004). The measurement of curiosity as a feeling of deprivation. *Journal of Personality Assessment,* doi:10.1207/s15327752jpa8202_3

Litman, J. A., & Silvia, P. J. (2006). The latent structure of trait curiosity: Evidence for interest and deprivation curiosity dimensions. *Journal of Personality Assessment*, doi:10.1207/s15327752jpa8603_07

Litman, J. A., & Spielberg, C. D. (2003). Measuring epistemic curiosity and its diversive and specific components. *Journal of Personality Assessment*, doi:10.1207/s15327752jpa8001_16

Mackinnon, A., Jorm, A. F., Christensen, H., Korten, A. E., Jacomb, P. A., & Rodgers, B. (1999). A short form of the Positive and Negative Affect Schedule: Evaluation of factorial validity and invariance across demographic variables in a community sample. *Personality and Individual Differences,* doi:10.1016/S0191-8869(98)00251-7

May, D. R., Gilson, R. L., & Harter, L. M. (2004). The psychological conditions of meaningfulness, safety and availability and the engagement of the human spirit at work. *Journal of Occupational & Organizational Psychology*, doi:10.1348/096317904322915892

Nezlek, J. B. (2012). *Multilevel modeling analyses of diary-style data*. New York: Guilford Press.

Ohly, S., Sonnentag, S., Niessen, C., & Zapf, D. (2010). Diary studies in organizational research: An introduction and some practical recommendations. *Journal of Personnel Psychology,* doi:10.1027/1866-5888/a000009

Ouweneel, E., Le Blanc, P. M., Schaufeli, W. B., & van Wijhe, C. I. (2012). Good morning, good day: A diary study on positive emotions, hope, and work engagement. *Human Relations,* doi:10.1177/0018726711429382

Park, N., Peterson, C., & Seligman, M. E. P. (2004). Reply: Strengths of character and well-being: A closer look at hope and modesty. *Journal of Social and Clinical Psychology,* doi:10.1521/jscp.23.5.628.50749

Pines, A. M. (1993). Burnout: An existential perspective. In W. B. Schaufeli, C. Maslach, & T. Marek (Eds.), *Professional burnout: Recent development in theory and research* (pp. 33-51). London: Taylor & Francis, doi:10.1016/s0965-2302 (97) 90071 - 0

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, doi:10.1037/0021-9010.88.5.879

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, doi:10.1037/0003-066X.55.1.68

Ryan, R. M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, doi:10.1111/j.1467-6494.1997.tb00326.x

Ryff, C. D., & Singer, B. (1998). The contours of positive human health. *Psychological Inquiry,* doi:10.1207/s15327965pli0901_1

Salanova, M., Cifre, E., Grau, R. M., Llorens, S., & Martínez, I. M. (2005). Antecedents of self-efficacy in university professors and students: A causal model. *Journal of Work and Organizational Psychology,* doi:10.1037/e337732004-001

Salanova, M., Llorens, S., Cifre, E., Martínez, I. M., & Schaufeli, W. B. (2003). Perceived collective efficacy, subjective well-being, and task performance among electronic work groups: An experimental study. *Small Group Research*, doi:10.1177/1046496402239577

Salanova, M., Schaufeli, W. B., Llorens, S., Peiro, J. M., & Grau, R. (2000). Desde el "burnout" al "engagement": ¿Una nueva perspectiva? [From burnout to engagement: A new perspective?]. *Journal of Work and Organizational Psychology*, *16*(2), 117-134.

Salanova, M., Schaufeli, W., Martínez, I., & Bresó, E. (2010). How obstacles and facilitators predict academic performance: The mediating role of study burnout and engagement. *Anxiety, Stress & Coping: An International Journal,* doi:10.1080/10615800802609965

Salmela-Aro, K., Kiuru, N., Leskinen, E., & Nurmi, J. (2009). School Burnout Inventory (SBI): Reliability and validity. *European Journal of Psychological Assessment*, doi:10.1027/1015-5759.25.1.48

Salmela-Aro, K., & Upadaya, K. (2012). The Schoolwork Engagement Inventory: Energy, dedication, and absorption (EDA). *European Journal of Psychological Assessment,* doi:10.1027/1015-5759/a000091

Sanz-Vergel, A., Demerouti, E., Moreno-Jiménez, B., & Mayo, M. (2010). Work-family balance and energy: A day-level study on recovery conditions. *Journal of Vocational Behavior,* doi:10.1016/j.jvb.2009.07.001

Savickas, M. L. (1997). Career adaptability: An integrative construct for life-span, life-space theory. *The Career Development Quarterly,* doi:10.1002/j.2161-0045.1997.tb00469.x

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement*, doi:10.1177/0013164405282471

Schaufeli, W. B., Martínez, I. M., Marques Pinto, A., Salanova, M., & Bakker, A. B. (2002). Burnout and engagement in university students: A cross-national study. *Journal of Cross-Cultural Psychology*, doi:10.1177/0022022102033005003

Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two-sample confirmatory factor analytic approach. *Journal of Happiness Studies,* doi:10.1023/A:1015630930326

Schreiner, L. A., Hulme, E., & Hetzel, R. (2009). Positive psychology on campus. In S. J. López & C. R. Snyder (Eds.), *The Oxford handbook of positive psychology* (pp. 569-578). New York: Oxford University Press. doi:10.1093/oxfordhb/9780195187243.013.0054

Silvia, P. J. (2008). Interest—The curious emotion. *Current Directions in Psychological Science*, doi:10.1111/j.1467-8721.2008.00548.x

Silvia, P. J. (2012). Curiosity and motivation. In R. M. Ryan (Ed.), *Oxford handbook of motivation*. New York, NY: Oxford University Press, doi:10.1093/oxfordhb/9780195399820.013.0010

Steger, M. F. (2009). Meaning in life. In S. J. Lopez (Ed.), *Oxford handbook of positive psychology* (2nd ed.) (pp. 679-687). Oxford, UK: Oxford University Press.

Steger, M. F., Fitch-Martin, A. R., Donnelly, J., & Rickard, K. M. (2014). Meaning in life and health: Proactive health orientation links meaning in life to health variables among American undergraduates. *Journal of Happiness Studies,* doi:10.1007/s10902-014-9523-6

Steger, M. F., & Frazier, P. (2005). Meaning in life: One link in the chain from religiousness to well-being. *Journal of Counseling Psychology,* doi:10.1037/0022-0167.52.4.574

Steger, M. F., Frazier, P., Oishi, S., & Kaler, M. (2006). The Meaning in Life Questionnaire: Assessing the presence of and search for meaning in life. *Journal of Counseling Psychology*, doi:10.1037/0022-0167.53.1.80

Steger, M. F., & Kashdan, T. B. (2007). Stability and specificity of meaning in life and life satisfaction over one year. *Journal of Happiness Studies,* doi:10.1007/s10902-006-9011-8

Steger, M. F., & Kashdan, T. B. (2013). The unbearable lightness of meaning: Well-being and unstable meaning in life. *The Journal of Positive Psychology,* doi:10.1080/17439760.2013.771208

Steger, M. F., Kashdan, T. B., Sullivan, B. A., & Lorentz, D. (2008). Understanding the search for meaning in life: Personality, cognitive style, and the dynamic between seeking and experiencing meaning. *Journal of Personality*, doi:10.1111/j.1467-6494.2007.00484.x

Steger, M. F., Oishi, S., & Kashdan, T. B. (2009). Meaning in life across the life span: Levels and correlates of meaning in life from emerging adulthood to older adulthood. *The Journal of Positive Psychology*. doi:10.1080/17439760802303127

Steger, M. F., Oishi, S., & Kesebir, S. (2011). Is a life without meaning satisfying? The moderating role of the search for meaning in satisfaction with life judgments. *The Journal of Positive Psychology*, doi:10.1080/17439760.2011.569171

Taris, T. W. (2006). Is there a relationship between burnout and objective performance? A critical review of 16 studies. *Work & Stress*, doi:10.1080/02678370601065893

Thoman, D. B., Smith, J. L., & Silvia, P. J. (2011). The resource replenishment function of interest. *Social Psychological and Personality Science*, doi:10.1177/1948550611402521

Van den Heuvel, M., Demerouti, E., Schreurs, B. H. J., Bakker, A. B., & Schaufeli, W. B. (2009). Does meaning-making help during organizational change? Development and validation of a new scale. *The Career Development International*, doi:10.1108/13620430910997277

Wang, H., & Li, J. (2015). How trait curiosity influences psychological well-being and emotional exhaustion: The mediating role of personal initiative. *Personality and Individual Differences*, doi:10.1016/j.paid.2014.11.020

Wharton, A. S. (1993). The affective consequences of service work: Managing emotions on the job. *Work and Occupations*, doi:10.1177/0730888493020002004

Worrell, F. C. (2014). *School and academic interventions*. Washington, DC: American Psychological Association, doi:10.1037/14187-030

Figure

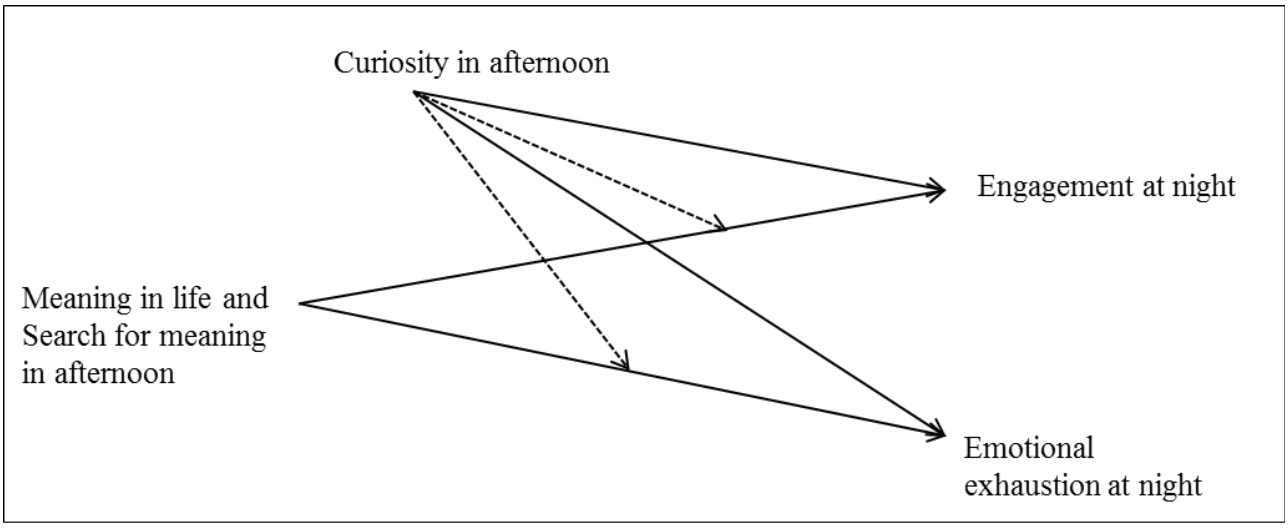

Figure 1. The proposed moderating model of curiosity
Note: ----- indirect effect, —— direct effect.

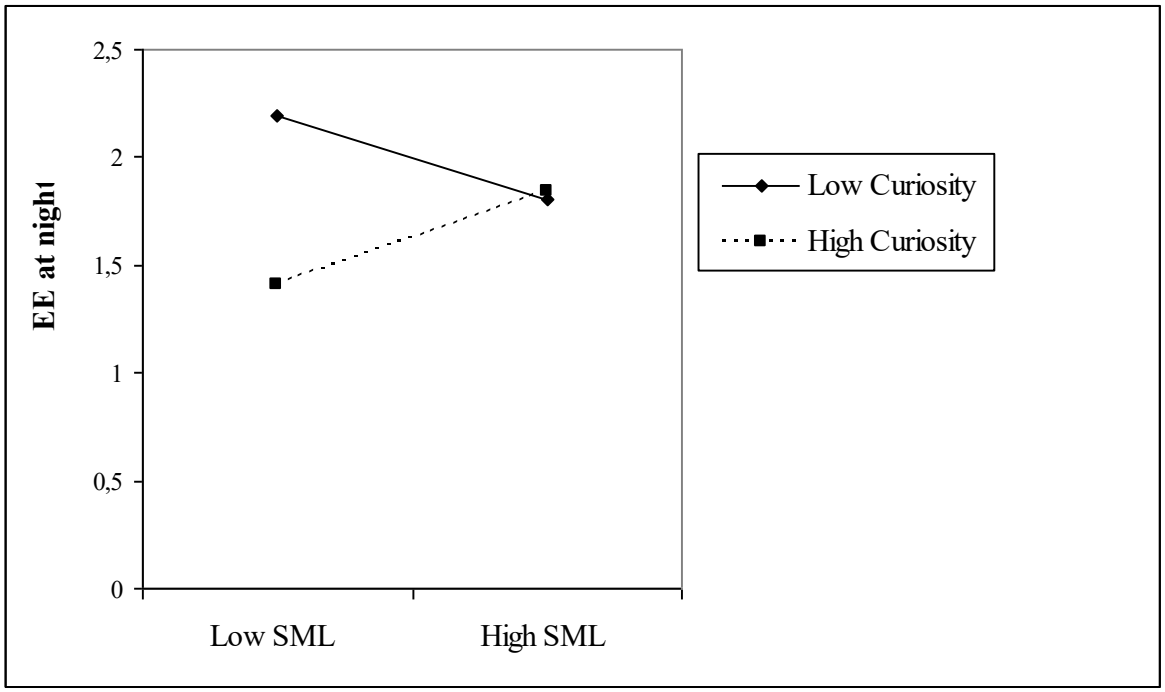

Figure 2. Interaction effects of SML and curiosity in predicting EE at night.
Note: SML= search for meaning in life; EE= emotional exhaustion

Table

Table 1.

Mean, standard deviation, intra-class correlations, Cronbach's alpha and bivariate correlations (N = 209 individuals, N = 1045 observations)

	M	DT	ICC	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.Sleep quality[a]	4.05	0.67	-	-														
2.Trait PA[a]	3.59	0.57	-	.24**	(.71)													
3.Trait NA[a]	1.95	0.67	-	-.13**	-.09	(.70)												
4.Trait Curiosity[a]	3.66	0.61	-	.06	.29**	-.22**	(.83)											
5.Trait PML[a]	4.84	1.19	-	.12**	.38**	-.22**	.18**	(.76)										
6.Trait SML[a]	3.38	1.56	-	-.01	.03	.31**	-.01	-.29**	(.92)									
7.Trait Engagement[a]	4.32	0.77	-	.16**	.40**	-.17**	.34**	.37**	-.03	(.81)								
8.Trait EE[a]	1.64	1.12	-	-.12**	-.09	.29**	-.15*	-.15*	.20**	-.31**	(.65)							
9.PA in the morning[b]	2.88	0.67	.58	.32**	.36**	-.20**	.26**	.26**	-.12**	.24**	-.05	(.78)						
10.NA in the morning[b]	1.73	0.72	.31	-.12**	-.06*	.25**	-.01	.10**	.02	-.03	.11**	-.015	(.92)					
11.Curiosity in the afternoon[b]	3.27	0.60	.40	.16**	.25**	-.07*	.51**	.15**	.08**	.21**	-.00	.38**	-.02	(.93)				
12.PML in the afternoon[b]	4.54	1.03	.63	.19**	.20**	-.12**	.11**	.64**	-.26**	.20**	-.05	.32**	.04	.19**	(.89)			
13.SML in the afternoon[b]	2.92	1.43	.15	.03	.03	.15**	.04	-.21**	.65**	-.04	.11**	-.05	.01	.09**	-.32**	(.96)		
14.Engagement at night[b]	3.86	0.78	67.6	.19**	.30**	-.20**	.23**	.29**	-.04	.61**	-.25**	.43**	-.07*	.44**	.34**	-.07**	(.95)	
15.EE at night[b]	1.81	1.14	69.4	-.17**	-.04	.20**	-.09**	-.01	.13**	-.15**	.45**	-.11**	.22**	-.02	-.12**	.21**	-.27**	(.93)

Note: PA= positive affect; NA= negative affect; PML= presence of meaning in life; SML=search for meaning; EE=emotional exhaustion

[a] Person-Level variables; [b] Day-Level variables

*Cronbach´ s alpha for general measures on the diagonal. For daily measures, the estimated reliability is defined as the ratio between the level-2 variance component and the sum of the level-2 and level-1 components, with the latter divided by the number of observations within of a particular cluster.

*ICC = intra-class correlation

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

Table 2.

Multilevel estimates for models predicting Engagement at night (N= 209 individuals, N= 1045 observations)

Variables	Null Model			Model 1			Model 2			Model 3			Model 4		
	Estimate	SE	*t*	Estimate	SE	*t*	Estimate	SE	*t*	Estimate	S0.042E	*t*	Estimate	SE	*t*
Intercept	3.874	0.054	71.74***	3.874	0.042	92.23***	3.874	0.042	92.23***	3.874	0.042	92.23***	3.880	0.042	92.38***
Gender[a]				0.051	0.109	0.46	0.054	0.110	0.49	0.054	0.110	0.49	0.052	0.109	0.47
Sleep quality[a]				0.060	0.019	3.15**	1.428	0.021	1.42	0.031	0.020	1.55	0.029	0.020	1.45
Trait Engagement[a]				0.616	0.055	11.20***	0.620	0.055	11.27***	0.620	0.055	11.27***	0.621	0.055	11.29***
PA in the morning[b]							0.067	0.028	2.39*	0.038	0.028	1.35	0.040	0.028	1.42
NA in the morning[b]							-0.081	0.040	-2.025*	-0.084	0.040	-2.10*	-0.084	0.039	-2.15*
Curiosity in the afternoon[b]										0.207	0.039	5.30***	0.203	0.039	5.20***
PML in the afternoon[b]										0.030	0.024	1.25	0.025	0.024	1.04
SML in the afternoon[b]										0.020	0.029	0.68	0.027	0.030	0.90
PML X Curiosity in the afternoon[b]													-0.100	0.063	-1.74
SML X Curiosity in the afternoon[b]													-0.002	0.058	-0.03
-2 X Log(lh)	2073.857			1963.622			1951.013			1917.021			1913.902		
Difference of -2 X Log				110.235***			12.609***			33.992***			3.119		
df[c]				3			2			3			2		
Level 1 intercept variance (SE)	0.552 (0.059)			0.317 (0.036)			0.320 (0.036)			0.322 (0.036)			0.320 (0.036)		
Level 2 intercept variance (SE)	0.264 (0.013)			0.262 (0.013)			0.257 (0.013)			0.248 (0.012)			0.247 (0.012)		

Note: PA= positive affect; NA= negative affect; PML= presence of meaning in life; SML=search for meaning in life.
[a] Person-Level variables; [b] Day-Level variables; [c] *df* refers to the number of parameters added to the model.
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 3.

Multilevel estimates for models predicting EE at night (N= 209 individuals, N= 1045 observations)

Variables	Null Model			Model 1			Model 2			Model 3			Model 4		
	Estimate	SE	*t*	Estimate	SE	*t*	Estimate	SE	*t*	Estimate	SE	*t*	Estimate	SE	*t*
Intercept	1.811	0.079	22.92***	1.810	0.069	26.23***	1.810	0.069	26.23***	1.812	0.069	26.26***	1.811	0.069	26.24***
Gender[a]				0.510	0.179	2.84**	0.508	0.179	2.83**	0.509	0.179	2.84**	0.517	0.179	2.88**
Sleep quality[a]				-0.105	0.027	-3.88***	-0.080	0.030	-2.66**	-0.081	0.029	-2.79**	-0.081	0.029	-2.79**
Trait EE[a]				0.440	0.061	7.21***	0.442	0.061	7.24***	0.444	0.061	7.27***	0.441	0.061	7.22***
PA in the morning[b]							-0.033	0.039	-0.84	-0.009	0.040	-0.22	-0.005	0.040	-0.12
NA in the morning[b]							0.113	0.057	1.98*	0.109	0.057	1.91	0.109	0.056	1.94
Curiosity in the afternoon[b]										-0.204	0.056	-3.64***	-0.188	0.056	-3.35***
PML in the afternoon[b]										-0.009	0.034	-0.26	0.021	0.034	0.61
SML in the afternoon[b]										0.010	0.042	0.23	0.014	0.042	0.33
PML X Curiosity in the afternoon[b]													-0.028	0.090	-0.31
SML X Curiosity in the afternoon[b]													0.204	0.083	2.45*
-2 X Log(lh)	2812.462			2740.563			2734.943			2714.426			2708.376		
Difference of -2 X Log				71.899***			5.620			20.517***			6.050*		
df[c]				3			2			3			2		
Level 1 intercept variance (SE)	1.201 (0.128)			0.874 (0.096)			0.878 (0.096)			0.884 (0.096)			0.879 (0.096)		
Level 2 intercept variance (SE)	0.529 (0026)			0.522 (0.026)			0.518 (0.026)			0.506 (0.025)			0.503 (0.025)		

Note: PA= positive affect; NA= negative affect; PML= presence of meaning in life; SML=search for meaning in life; EE = emotional exhaustion
[a] Person-Level variables; [b] Day-Level variables; [c] *df* refers to the number of parameters added to the model.
* $p < .05$, ** $p < .01$, *** $p < .001$