



Master Thesis

Need Valuation as a Moderator on the Relationship between Need Satisfaction and Well-being in Higher Education

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Preface

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Abstract

In their everyday life, students at university have to deal with competing demands, which challenge their well-being. However, student well-being is important for students' academic success. According to the Basic Psychological Needs Theory, the three needs autonomy, competence, and relatedness have to be satisfied for an individual to experience well-being. Nevertheless, there might exist individual differences in need valuation or the assigned importance of a need. Previous researched produced mixed results regarding a possible moderation effect of need valuation. The objective of this study is to examine whether need valuation serves as a moderator on the relationship between need satisfaction and well-being in a higher education context. Therefore, the moderating role of need valuation in the specific context of higher education was examined and general and domain-specific measures of well-being were compared. The cross-sectional study examined need satisfaction, need valuation and the two well-being measures in a student sample (N=171). Correlational analyses between all constructs were analysed. Six moderations tests were performed, one for each need with either general or domain-specific well-being as the outcome measure. Consistent with previous findings, it was shown that need satisfaction of all three needs correlates with well-being ($p < .05$). However, no significant moderation was found of need valuation on the relationship between need satisfaction and well-being. The results might imply a possible trend, where only autonomy valuation serves as a moderator between need satisfaction and well-being. Based on these findings, it is important for universities to create a learning environment which supports the satisfaction of the three needs to promote student's well-being.

Keywords

Basic Psychological Needs, Need valuation, Need satisfaction, Higher education

Introduction

University students' well-being is important for their academic success. Specifically, it has been shown that higher student well-being is linked to higher academic performance (Adler, 2017; Chambel & Curren, 2005; Choi, Lee, Yoo, & Ko, 2019). Furthermore, students who feel good within the context of their studies are more engaged and motivated, leading to a deeper understanding of the learning material (Jang, Reeve, Ryan, & Kim, 2009). However, the demands of higher education, which include dealing with competing goals and managing emotional reactions to successes and disappointments, often challenge students' well-being (Chambel & Curren, 2005). Therefore, it is important to investigate factors which influence university students' well-being, to ensure that they can develop their full potential.

The concept of well-being is grounded in two long-established traditions, namely hedonic and eudaimonic traditions (Waterman, 1993). Based on the eudaimonic tradition, psychological well-being focuses on optimal functioning of an individual (Waterman, 1993). In this sense, well-being can be described as life satisfaction. According to Diener, Emmons, Larsen, and Griffin (1985), life satisfaction measures the cognitive-judgemental aspect of subjective well-being. This means that life satisfaction is an overall evaluation of an individual's quality of life compared to one's ideal (Shin & Johnson, 1978). For example, an individual is thought to be completely satisfied with their life, if they would change nothing and live their life according to their ideal (Diener et al., 1985).

A context-specific measure of eudaimonic well-being within education is study engagement. Generally, engagement describes a persistent and positive state of mind, which is described by energy, commitment and concentration (Schaufeli & Bakker, 2003). Engaged students are therefore characterized as energetic and concentrated during, and inspired by their studies (Schaufeli & Bakker, 2003). Consequently, engaged students can be seen as functioning optimally in the context of their studies.

One conceptual framework which can be used to explain the development of well-being is the Self-determination theory (SDT; Ryan & Deci, 2017). The theory assumes that humans have an innate tendency to grow and master challenges and opportunities to learn (Ryan, 2009). Nevertheless, these innate tendencies do not develop and work automatically but are influenced by contexts and environments, which can either improve or hinder human flourishing and well-being (Ryan & Deci, 2017).

Within the SDT there are six mini-theories, one of them being the Basic Psychological Needs Theory (BPNT; Ryan, 2009). This theory elaborates the basic psychological needs, namely autonomy, relatedness and competence, and their relationship to well-being (Ryan,

2009). *Autonomy* describes the desire to act out of one's own choice and to have psychological freedom (Ryan, Huta, & Deci, 2008). *Competence* is the need to feel mastery and efficacy and means feeling able to effectively interact with the environment to achieve personally valued outcomes and master challenges (Ryan & Deci, 2017). Finally, *relatedness* is defined as the individual's desire to develop and maintain close and meaningful relationships with others (Ryan et al., 2008). These basic psychological needs are thought to be universal, and thus BPNT is relevant in any developmental stage and culture (Ryan & Deci, 2017).

It is argued that within a specific context all three needs have to be satisfied in order for an individual to function optimally (Ryan & Deci, 2017). Contexts and environments which support these needs should also have a positive impact on well-being (Ryan, 2009). It was shown that need satisfaction of all three basic needs is positively linked to life satisfaction (Chen et al., 2015). This demonstrates that individuals whose needs are satisfied experience their life as closer to their ideal compared to people whose needs are not satisfied. Corresponding to this, Cordeiro, Paixão, Lens, Lacante, and Luyckx (2016) showed that individuals who experience greater need satisfaction than others also report higher well-being. This relationship between need satisfaction and well-being was shown to hold true in many domains, including sport (Wilson, Longley, Muon, Rodgers, & Murray, 2006), relationships (Patrick, Knee, Canevello, & Lonsbary, 2007), school (Maralani, Lavasani, & Hejazi, 2016) and work (Baard, Deci, & Ryan, 2004).

Especially in the domain of school, need satisfaction was shown to be linked to increased engagement and higher academic achievement. It was shown that basic psychological need satisfaction enhanced academic achievement and student performance (Liu & Flick, 2019; Wang, Tian, & Scott Huebner, 2019). Maralani et al. (2016) also demonstrated that the satisfaction of autonomy, competence and relatedness is positively linked to increased engagement of students. This shows that the general relationship between need satisfaction and well-being, also holds in an educational setting.

The aforementioned relationship, namely that the satisfaction of all three basic psychological needs is related with positive consequences for all individuals, irrespective of, for instance, culture or gender (Deci & Ryan, 2000). This central principle of SDT is called the universality claim (Deci & Ryan, 2000). However, Vansteenkiste, Ryan, and Soenens (2020) suggested that the universality claim should be interpreted in a more liberal way. It was advocated that all individuals are likely to benefit from the satisfaction of the needs, but differences in the preference of these needs might occur (Vansteenkiste et al., 2020).

One way to conceptualize these individual differences is need valuation. Need valuation describes differences in the perceived importance of the satisfaction of a particular need (Heine, Lehman, Markus, & Kitayama, 1999). More specifically, students might perceive one need, for instance, autonomy, as more important. Consequently, the satisfaction of this need may lead to a stronger relation to well-being for these students, compared to students for whom this need is less important (Hofer & Busch, 2011). However, previous studies examining the moderating role of need valuation have produced mixed results. On the one hand, Chen et al. (2015) did not find evidence for a moderating role of need valuation on the relationship between need satisfaction and well-being in a Chinese and Belgian student sample. In line with this, the personally perceived effects of need satisfaction on well-being did not moderate the relationship between need satisfaction and well-being (Neubauer, Lerche, Köhler, & Voss, 2020). On the other hand, Van Assche, van der Kaap- Deeder, Audenaert, De Schryver, and Vansteenkiste (2018) showed that high autonomy valuation enhanced the strength of the relationship between autonomy satisfaction and vitality, a measure for well-being. This shows that more research is needed to clarify the role of need valuation in the basic psychological needs theory.

One possible explaining factor for these mixed results relates to the measure of well-being. It has been suggested that the size of the moderation effects of need valuation on the relationship between need satisfaction and well-being might depend on the type of outcome. For instance, Schüler, Brandstätter, and Sheldon (2013) examined the moderating role of the motivation to achieve on the relationship between competence satisfaction and well-being in a general and a domain-specific context. It was shown that the positive effect of competence satisfaction on well-being in an educational context was moderated by the achievement motive only when a domain-specific measure of well-being is being used, but not a general measure of well-being (Schüler et al., 2013). In this sense, when measured in a specific context, domain-specific need valuation might only moderate the relationship between domain-specific need satisfaction and domain-specific well-being, but not general well-being.

The current study will examine the moderating influence of need valuation on the relationship between the satisfaction of the basic psychological needs and well-being in the context of higher education. Building on the work of Schüler et al. (2013), who showed that domain-specific need satisfaction is possibly moderated by the achievement motive only concerning domain-specific well-being, this study will add to this existing research by analysing the moderating role of need valuation in a domain-specific context, namely higher education. Consequently, this study will compare domain specific and general well-being measures to further explore the moderating role of need valuation.

Hypothesis 1: Need satisfaction of the basic psychological needs positively relates to well-being in students.

Hypothesis 2: A higher need valuation is expected to increase the relationship between need satisfaction and well-being.

Research question 1: Does need valuation as a moderator strengthen the relationship between need satisfaction and domain-specific well-being, but not general well-being?

Methods

Participants

In total 204 participants took part in the study. Participants had to be enrolled at a higher education facility to take part in this study. Due to not being enrolled at a higher education facility, 31 participants had to be excluded from the analysis and one participant had to be excluded as they did not agree to the informed consent. Moreover, data from one participant was excluded due to being an outlier on three variables. Consequently, the final sample included 171 participants, of which with a mean age of 22.19 years ($SD = 2.54$). The majority of participants were German (123; 71.9%), nine people were from the USA (5.3%), and 39 (22.8%) were from one of 23 other nationalities.

Design and Procedure

The cross-sectional online survey was created through *Qualtrics*, an online survey tool. It could be filled in from 20th April to 4th May 2020 and could be activated via a link. The study was part of a collective research project about the basic psychological need theory. Ethical approval was granted by the faculty of the Behavioural, Management and Social Sciences (BMS) of the University of Twente (registration number 200444).

The participants were recruited using a convenience sampling method. Specifically, participants were partly recruited through *SONA Systems*, an online tool used by the University of Twente which rewards students for participating in research by giving them extra study credits. Students received 0.25 credits for participating in this study. The researchers contacted further eligible respondents personally. Furthermore, a snowball sampling method was used, as participants were asked to send the questionnaire to additional eligible respondents in their

environment. When participating in the online survey, respondents were able to give an online informed consent before filling out the questionnaire. Furthermore, the self-report questionnaires regarding need satisfaction, need valuation and well-being were filled out anonymously at one point in time.

Measures

Basic psychological need satisfaction. The Basic Psychological Need Satisfaction and Need Frustration scale (BPNSNF; Chen et al., 2015) was used to assess need satisfaction. The scale measures need satisfaction as well as need frustration for each of the three basic needs, namely autonomy, competence, and relatedness. However, for the purpose of this study, only the need satisfaction scores were used. The wording of the items was adjusted to fit the scope of the study based on the Dutch BPNSNF scale for students, for instance, by adding the words “in my studies” (Vandenkerckhove et al., 2019). The questionnaire includes a total of 24 items, of which 12 measured the satisfaction of the needs of autonomy (e.g. “I feel a sense of choice and freedom in the things I undertake in my studies”), competence (e.g. “In my studies I feel capable at what I do”), and relatedness (e.g. “I feel connected with my friends at university”). The scale was rated on a 5-point Likert scale, from 1 = *Completely disagree* to 5 = *Completely agree*. The satisfaction score was calculated for each need separately by calculating the mean of the respective need satisfaction-items. As a result, scores range from 1 to 5, with lower scores indicating low need satisfaction and higher scores indicating higher need satisfaction (Chen et al., 2015). The internal consistency of the need satisfaction scale was good to acceptable in the initial validation of the questionnaire, with a Cronbach’s alpha coefficient for autonomy between .69 and .82, for competence between .74 and .88, and for relatedness between .65 and .83 (Chen et al., 2015). In this study the Cronbach’s alpha was .68 for autonomy, .86 for competence and .91 for relatedness. Therefore, the internal consistency for the need satisfaction scale was acceptable to excellent.

Need valuation. In order to measure need valuation, the items regarding need satisfaction of the BPNSNF scale were adapted, following the example of autonomy by Van Assche et al. (2018). Specifically, Van Assche et al. (2018) reworded each item of the autonomy scale into a question to capture how important students perceived the need to be. For this study, all items of the BPNSNF satisfaction scale were reworded and the specific focus on studies was included as well, for instance, by adding the words “in your studies.” An example item is “How important is it for you to feel a sense of choice and freedom in the things you undertake in your studies?” Items were rated on a 5-point Likert scale, from 1 = *not at all important* to 5 = *very*

important. Scores for each need were calculated by averaging the items for each need, resulting in scores ranging from 1 to 5, where low scores suggest low need valuation and higher scores suggesting higher need valuation. Furthermore, internal consistency for the autonomy need valuation was shown to be acceptable, with a Cronbach's alpha of .77 (Van Assche et al., 2018). The internal consistency for need valuation was acceptable to good in this study, with .67 for autonomy, .79 for competence and .89 for relatedness.

Well-being. Study engagement and life satisfaction were used to measure domain-specific and general well-being, respectively. The short-version of the Utrecht Work Engagement Scale for Students (UWES-S; Schaufeli & Bakker, 2003) was used to measure domain-specific well-being and assesses study engagement. Study engagement is a positive and persistent state of mind characterized by energy, perseverance and concentration (Schaufeli, Martínez, Pinto, Salanova, & Bakker, 2002). The 9-item questionnaire includes three subscales, namely vigour, dedication and absorption (Schaufeli & Bakker, 2003). Each subscale is measured by three items, examples being "When I'm doing my work as a student, I feel bursting with energy" for vigour, "My studies inspires me" for dedication, and "I am immersed in my studies" for absorption. All items were scored on a 7-point frequency rating scale with 0 = *Never* to 6 = *Always*. A total score is calculated by adding all individual scores and ranges from 0 to 54, where lower scores indicate low study engagement and higher scores indicating high study engagement (Schaufeli & Bakker, 2003). The internal consistency for all three subscales as well as the total scale was good. Cronbach's alpha for vigour was .77, for dedication .85, for absorption .78, and .92 for the total scale (Schaufeli, Bakker, & Salanova, 2006). This study showed a Cronbach's alpha of .84 for the total scale, showing good internal consistency. Cronbach's alpha for vigour was .69 and for dedication .82, showing acceptable and good internal consistencies. For absorption Cronbach's alpha was .63, which shows questionable internal consistency.

Additionally, the Satisfaction with Life scale (SWLS), developed by Beaman, Klentz, Diener, and Svanum (1979), was used to assess general well-being and an individual's general satisfaction with life. The scale encompasses 5 items, for example "In most ways my life is close to my ideal." All statements are rated on a 7-point scale, with 1 = *strongly disagree* to 7 = *strongly agree*. The total score is calculated by adding all individual scores and ranges from 5 to 35, with higher scores indicating satisfaction with one's life (Diener et al., 1985). Moreover, the scale showed good internal consistencies, with Cronbach's alpha of .87 (Diener et al., 1985). Furthermore, the present study showed a similar Cronbach's alpha of .86.

Data analysis

The statistical software IBM SPSS Statistics (25.0) was used to conduct the statistical analyses. A significance level of $p < .05$ was used for all analyses. First, the data was screened for any significant outliers. Outliers were removed if they screened as an outlier on three variables, which was the case for one person. Additionally, the necessary assumptions of normality, linearity and homoscedasticity were examined. It was shown that the assumptions were not violated. The first hypothesis, namely whether need satisfaction is positively related to well-being, was examined by performing a correlation using Pearson's r . Correlations were analysed with $r \leq .29$ showing weak, $r \leq .49$ moderate and $r \geq .50$ strong correlations (Cohen, 1988).

The second hypothesis, namely whether need valuation serves as a moderator between need satisfaction and well-being, was examined using a moderation analysis. Therefore, six separate moderation analysis were conducted for each need individually using *PROCESS macro 3.4* (Hayes, 2013). Need satisfaction was used as the independent variable, need valuation as the moderator, and domain-specific and general well-being as the dependent variables. The following options were selected for the analysis: model 1, 95% confidence intervals, 1000 bootstrap samples, conditioning values of -1SD, Mean, +1SD, mean centre for construction of products, heteroscedasticity-consistent inference HC3 which corrects for possible heteroscedasticity and should be used for sample sizes less than 250 (Long & Ervin, 1998), and Johnson-Neyman output for visualising interactions.

Results

Descriptives and correlations

The means, standard deviations, and correlations of need satisfaction, need valuation, and well-being are shown in Table 1. It can be seen that all three need satisfaction scores are weakly to moderately correlated to each other. Furthermore, need satisfaction of autonomy and relatedness showed a weak and moderate relationship to autonomy and relatedness valuation, respectively. Competence valuation was not significantly related to competence satisfaction. Need satisfaction of all three needs was moderately to strongly correlated to study engagement and life satisfaction. The strongest correlation was found for autonomy satisfaction and study engagement. The need for relatedness was rated as most important, whereas autonomy was rated as less important, and competence was rated as least important by participants.

Table 1.

Means, SDs and correlations of the basic needs satisfaction and basic need valuation in studies and well-being (N= 171).

	Scale	M	SD	1.	2.	3.	4.	5.	6.	7.
Need satisfaction										
1. Autonomy	1-5	3.48	0.68	-						
2. Competence	1-5	3.66	0.78	.40**	-					
3. Relatedness	1-5	3.84	1.01	.29**	.43**	-				
Need Valuation										
4. Autonomy	1-5	4.02	0.61	.17*	.04	.09	-			
5. Competence	1-5	3.86	0.93	.13	-.01	.00	.30**	-		
6. Relatedness	1-5	4.29	0.51	.15	.16*	.48**	.30**	.23**	-	
Well-being										
7. Study engagement	0-54	30.77	6.93	.55**	.49**	.27**	.18*	.10	.17*	-
8. Life Satisfaction	5-35	23.62	6.03	.27**	.36**	.33**	.09	-.07	.11	.44**

Note: * $p < .05$ ** $p < .01$

Moderating role of need valuation on study engagement

In order to test the moderating role of need valuation on study engagement, three moderation analyses were conducted. The overall fit to model using study engagement was good for autonomy ($R^2 = .32$, not in table) and competence ($R^2 = .26$, not in table), and poor for relatedness ($R^2 = .07$, not in table). The moderation test showed that need valuation was not a significant moderator of the relationship between need satisfaction of all three needs and study engagement (Table 2). The interaction term between need satisfaction and need valuation explained no significant proportion of variance in study engagement for autonomy, competence, or relatedness. This means that the relationship between need satisfaction and study engagement was not affected by need valuation.

Moderating role of need valuation on life satisfaction

Three moderation analyses were conducted to determine whether need satisfaction and need valuation could predict life satisfaction. The overall fit to model using life satisfaction was good for competence ($R^2 = .37$, not in table) and relatedness ($R^2 = .33$, not in table), and poor for autonomy ($R^2 = .09$, not in table). No significant moderation was found of need valuation on the relationship between need satisfaction and life satisfaction (Table 2). The interaction term between need satisfaction and need valuation accounted for no significant proportion of

variance in life satisfaction for autonomy, competence, or relatedness. This means that the relationship between need satisfaction and life satisfaction was not affected by need valuation.

Table 2.

Results of moderation analyses for well-being, predicted by need satisfaction moderated by need valuation (N=171).

Variables	Study Engagement						Life Satisfaction					
	ΔR^2	F	<i>b</i>	df	t	<i>p</i>	ΔR^2	F	<i>b</i>	df	t	<i>p</i>
Autonomy	.00	0.39	-0.73	167	-0.63	.53	.02	3.11	-1.84	167	-1.76	.08
Competence	.00	1.16	1.13	167	1.08	.28	.00	0.15	-0.53	167	-0.39	.70
Relatedness	.00	0.00	0.04	167	0.06	.95	.00	0.04	0.11	167	0.21	.84

N.B. *b* = unstandardized coefficient.

Discussion

The aim of this study was to investigate whether the relationship of the satisfaction of the basic psychological needs of autonomy, competence, and relatedness to well-being is moderated by need valuation in the context of higher education. Moreover, the study aimed to explore whether this moderation is more pronounced for domain-specific well-being, compared to general well-being. The findings suggest that need satisfaction of all three needs in the context of higher education is positively related to both well-being measures. This shows that students who reported a high need satisfaction also reported a high well-being. Therefore, the first hypothesis, namely whether need satisfaction is related to well-being, can be accepted. This is in line with the BPNT, stating that people whose needs are satisfied will also show a higher well-being (Ryan & Deci, 2017) and corroborates findings from many other studies, which showed that need satisfaction leads to well-being (Chen et al., 2015; Milyavskaya & Koestner, 2011; van der Kaap-Deeder, Vansteenkiste, Soenens, & Mabbe, 2017).

Additionally, the results showed that need valuation does not moderate the relationship between need satisfaction and well-being. In other words, students who rated a need as more important to them, did not report higher well-being when this need was met than students who perceived this need to be less important. Hence, the second hypothesis has to be rejected, meaning the current findings support the universality claim of the BPNT. This finding also

supports a previous study by Chen et al. (2015), who did not find evidence for a moderating role of need valuation.

In contrast to this, Van Assche et al. (2018) found that autonomy valuation moderates the relationship between autonomy satisfaction and vitality. Likewise, the only moderation which was borderline significant in the current study was of autonomy valuation on the relationship between autonomy satisfaction and general well-being. Even though the present study did not find a significant moderating effect of autonomy valuation, a general trend might be seen where autonomy valuation serves as a moderator, but competence and relatedness valuation do not. One reason for the fact that this study was not able to replicate the significant moderation effects might be the outcome measure. Van Assche et al. (2018) did not find any significant interaction effects when predicting life satisfaction or quality of life. As the current study used life satisfaction as a measure for general well-being, this study was able to imitate the result, by showing that for life satisfaction no significant interaction effect emerged. However, the precise reason the outcome variable seems to be important when looking at the moderating role of need valuation is to be determined by future research.

Similarly, the assumption from Schüler et al. (2013) that need valuation moderates the relationship between domain-specific need satisfaction and domain-specific well-being more strongly is not supported by the current results. One reason for the difference in results is the fact that Schüler et al. (2013) used implicit measures for need valuation, whereas this study employed explicit self-reported measures. Implicit measures are semi-projective measures, which often include having to look at a picture and rating statements about it (Sokolowski, Schmalt, Langens, & Puca, 2000). It may be that implicit measures of need valuation are more sensitive to revealing moderation effects (Van Assche et al., 2018; Wörtler, Van Yperen, & Barelds, 2019). Results from previous studies employing implicit measures seem to support this (Schüler et al., 2013; Van Assche et al., 2018). However, these studies did not use need valuation as a moderator, but either need desire or the achievement motive, a concept from Motive Disposition Theory. To the researcher's knowledge, there are no implicit measures for need valuation available at this time, therefore the use of explicit measures is necessary. Another reason for using explicit measures is the fact that they provide a more straightforward measure of need valuation.

Limitations and Strengths

This study is the first to research the moderating value of need valuation on need satisfaction and well-being in a study context, while simultaneously comparing domain-specific

and general well-being. So far, there have only been three other studies which researched this topic in a general context (see (Chen et al., 2015; Van Assche et al., 2018; Wörtler et al., 2019). Thus, this study adds to the research by examining the moderating effect of need valuation in a domain-specific context.

A limitation of the present study is the fact that it was only correlational study. Consequently, no claims regarding causality can be made. To further clarify the directionality of the relationship between need satisfaction and well-being, longitudinal studies are necessary. Even though most previous studies employed a cross-sectional design similar to the one used in this study, several studies have examined the predictive value of need satisfaction on well-being (Cordeiro et al., 2016; León & Núñez, 2013; Vansteenkiste, Lens, Soenens, & Luyckx, 2006). These studies showed that need satisfaction predicts general well-being in a variety of domains and contexts.

Another limitation is the fact that the present study only included life satisfaction as a measure for general well-being. Thus, the study design could have been improved further by including a broader scope for measuring general well-being. Even though life satisfaction was shown to correlate with positive thoughts and emotions and poses a reliable measure for an individual's overall well-being (Diener, Suh, Lucas, & Smith, 1999), other aspects of well-being have been neglected, for instance, the aspect of vitality and positive emotions. In contrast to life satisfaction which focuses on a cognitive evaluation of one's life, vitality focuses on the energy available to oneself (Ryan & Frederick, 1997), and positive emotions focuses on the affective aspects of well-being (Watson, Clark, & Tellegen, 1988). Including additional measures to assess these aspects of well-being could provide a more complete picture regarding the level of general well-being.

It is also important to note that this study was carried out during the Corona-crisis, which might have influenced the results. Early studies showed that the Corona-crisis has a negative impact on well-being in the general population, with increasing depressive and anxiety symptoms (Li, Wang, Xue, Zhao, & Zhu, 2020; Rajkumar, 2020). The closing of universities and campuses, and the start of online education, has caused feelings of uncertainty and anxiety for many university students (Kafka, 2020). This new situation of learning from home and having online classes might have affected the results of this study as well. This is supported by the fact that seven students explicitly mentioned that the Corona-crisis has influenced their answers, which is also reflected in the data (see Appendix A). For competence need satisfaction specifically, there were ten data points with exceptionally low scores compared to the rest of the data. One reason for this might be having online classes and studying exclusively from

home, which is a new situation for most students. Consequently, they might feel less competent, as they have to navigate these novel circumstances and find new ways of studying.

Nevertheless, when compared to normative scores the scores of need satisfaction (Chen et al., 2015), autonomy valuation (Van Assche et al., 2018), study engagement (Loscalzo & Giannini, 2019) and life satisfaction (Diener et al., 1985) seem to be within the norm. No normative scores are available for competence and relatedness valuation. Therefore, it seems unlikely that the fact that the data was collected during the Corona-crisis had an impact on the hypotheses. The unique situation during which this study was carried out should nonetheless still be kept in mind when interpreting the results and comparing them to those from other studies.

Future research and practical implications

Students in higher education have to deal with competing goals and demands in their studies, which often challenge their well-being (Chambel & Curren, 2005). However, student's well-being is integral for them to succeed at higher education (Adler, 2016; Choi et al., 2019). In the present study the positive link between need satisfaction and both domain-specific and general well-being in a higher educational context was replicated. This study further showed that this relationship is not influenced by need valuation, therefore the three needs are thought to be equally important for the well-being of students. Universities and colleges should therefore aim to create a learning environment which supports the basic psychological needs of autonomy, competence, and relatedness, in order to satisfy student's well-being and for them to succeed (Dyrbye et al., 2009; Field, Duffy, & Huggins, 2015).

In order to facilitate autonomy in students, universities should try to minimize coercion and evaluative pressure whenever possible (Niemi & Ryan, 2009). In this way learning is less focused on grades and more focused on understanding, which allows students more room to self-organize (Levesque, Zuehlke, Stanek, & Ryan, 2004). Furthermore, competence and relatedness can be facilitated by providing regular feedback which emphasises students' efficacy. By providing regular feedback, the professors and teachers are more involved with the students, which supports relatedness satisfaction (Niemi & Ryan, 2009). Simultaneously, the quality of feedback can foster competence satisfaction when focusing on students' efficacy (Levesque et al., 2004).

This study was able to add to the research regarding individual differences in need strengths in the Basic Psychological Needs Theory. An indication of a trend which seems to emerge with the findings from this study and the findings by Van Assche et al. (2018) is that

autonomy might be the only need which is moderated by need valuation. However, the conflicting results of this and previous studies (Chen et al., 2015; Van Assche et al., 2018) warrant more research into a possible moderating role of need valuation. One possible direction for future research might be to develop and test an implicit measure for need valuation. Van Assche et al. (2018) and Schüler et al. (2013) showed that implicit measures of need strength, but not explicit measures, were more likely to moderate the relationship between need satisfaction and well-being. In this sense, future research might be able to shed more light on the possible moderating role of need valuation and the conflicting results.

Conclusion

The current study investigated the moderating role of need valuation on the relationship between need satisfaction and either domain-specific or general well-being in a higher education context. The findings show that need satisfaction is positively linked to both well-being outcomes, but this relationship is not moderated by need valuation. Nevertheless, this study added to existing research by confirming that need satisfaction leads to well-being in a higher education context. Moreover, this study provides results which might indicate a general trend where only autonomy valuation might serve as a moderator, thus prompting further research in this direction.

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Appendix A – Comments from participants

1. Redundant! Aber sicherlich gewollt;) Danke und alles Gute für die Studie!
2. Please check if your study is really anonymous like stated on the first page, or if it is pseudonymized. I don't know if there are any legal implications regarding that to you. In the IT-Industry it is a big topic, that is easily mistaken, which can lead to some legal issue in some cases. So I'm just noticing this so you're on the safe side with it.
3. Some of the questions in the early part were mostly questioning from a positive angle, almost never the inverse. Was that intentional?
4. During last week I wasn't in my best mood at all due to personal issues, quarantine and so on.
5. The answers to the questions about how I am feeling are mostly related at this moment to personal circumstances, and the fact we have to be isolated due to corona.
6. I don't have a close connection to my friends at university but to other friends besides the university.
7. I feel very affected by the current situation (Corona Crisis) and that is definitely affecting my current concentration and ability to focus. Also, I don't know what's going to happen after the summer when I am graduate, so I am more 'fearful' and nervous than usually. Although I feel in control of my studies, things around me make me feel less in control.
8. Classes online had made me want to get coronavirus, is very stressful everything...
9. Hey there, I guess corona changes a lot of my answers. This is the first term I experience difficulty "getting going" because I am not good at home office. Usually I would get up and leave for courses or the library or work. Staying home I experience a lack of motivation that is new for I utterly love my studies. And somehow now studying at home alone studying is more about my grades and efforts because the interaction with my friends is now separated from it. I hope this is helpful.
Good luck!
10. Warm regards
11. My classes are currently over and have been for a few weeks now so for the ones that said "in the past week" I used my last week of school, hope that's okay!!
12. So sorry, maybe I'm just biased for the coronavirus ^^'
13. This is a really interesting study and I'm really excited for the results! I feel like I should tell you though that I suffer from different mental illnesses (I am diagnosed with depression and anxiety and waiting for an ADHD diagnosis) which influenced some of my answers. I wish you the best of luck with this study!!

14. Good luck!
15. It was great and had the perfect length!
16. I'm studying to get my master's degree so I have a lot less interaction with peers than I did in undergrad
17. Studying online worsens the overall experience, but warmth while talking to uni friends is helpful
18. I found it difficult to answer the questions about what I desire because many things are going well in my studies and I obviously want them to stay like this, so I desire them to be like this. I do not desire these things because they are not like this but because I want them to stay like this. In this part I was a little bit confused.
19. I'm glad to be part of the study
20. Thanks for letting me participate