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University in the rear-view mirror: psychological needs in pleasant and unpleasant memories of alumni

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ABSTRACT

The university years are an important life phase for academics that shapes their transition from adolescence to adulthood. Here, we aimed to contribute to a better understanding on how alumni construe both nostalgic memories and regrets about this period. In line with Self-Determination Theory, we assumed that we would find frequent references to the basic psychological needs for autonomy, competence, and relatedness within pleasant memories (need satisfaction) and unpleasant memories (need frustration). We analyzed survey data sampled from 263 bachelor alumni of a German university, who answered two open questions on pleasant and unpleasant memories about their bachelor studies. Two raters applied a sequential coding procedure to evaluate the material. We found that 62.5% of the pleasant memories and 46.9% of the unpleasant memories included notions of basic psychological needs. Furthermore, quality of teaching and study content were frequently mentioned as part of the memories. This result pattern indicates that the basic needs for autonomy, competence, and relatedness are central for the retrospective construal of alumni's time at university. It stands to debate whether need-supportive learning environments can, thus, provide optimal conditions for experiences that will linger pleasantly in the memories of university alumni.

In addition to providing academic training (i.e. the development of professional skills bound to one's academic discipline), universities are socializing agencies that have an impact on and interact with students' identities (Janke et al. 2017) and habitus (Reay, Crozier, and Clayton 2009). Consequently, the university years substantially shape individuals' life courses as a period of academic and personal growth. These years additionally often covary with the period in life that is typically remembered most fondly (i.e. late teenage years and early twenties, so called reminiscence bump; Glück and Bluck 2007). Later on, memories about this life span can provide resources for coping with challenging life tasks and crises (Routledge et al. 2008; Sedikides et al. 2016). Thus, a relevant question is what exactly alumni remember when recalling their time at university beyond general positivity. In this contribution, we aim to identify aspects of university life that stick in the mind and can influence the emotional valence ascribed to this important life period.

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University years as a crucial time for the development of autobiographical memories

The time at university marks an important transition period from adolescence to adulthood. While adolescence is a time of identity development, the challenge of becoming an adult is to become (more) independent and self-reliant. Memories of this period are typically characterized by strong positivity and feelings of control as well as personal growth (Glück and Bluck 2007). The relative centrality of those memories underlines their importance for future life stages because reliving such pleasant memories (i.e. experiences of nostalgia, defined as sentimental longing for the past; Sedikides et al. 2016) is an important resource that helps individuals to cope with momentary threat (Routledge et al. 2008) and bolster self-regard (Wildschut et al. 2006). Nostalgic memories enhance feelings of self-continuity by providing a positive link between one's past and one's present (Sedikides et al. 2016).

However, the university years can also come with distress that is remembered less fondly. Educational sociologists have argued that those years can be characterized by hardship especially for students striving for upward mobility (Lehmann 2014). This notion is supported by research showing that students from non-academic households experience strong tension when coming to terms with academic habitus and developing their new identity as academics (Reay, Crozier, and Clayton 2009), whereas students from academic households benefit from an already developed sense of entitlement that likely protects them from anticipating academic failure (Janke et al. 2017). While individuals may integrate some of the distressing experiences into positive life narratives about overcoming obstacles, other experiences may continue to linger in memory as unpleasant recollections. Especially memories associated with regret (i.e. feelings of self-blame based on the realization or imagination that past decisions had a negative impact on the life course; Zeelenberg and Pieters 2007) can impair psychological adjustment in the here and now (Lecci, Okun, and Karoly 1994). Alumni could, thus, experience negative affect and ill-being at a later point in life, if they remember their time at university primarily as an unpleasant experience.

One can conclude that it matters whether alumni remember their time at university fondly or negatively. It should be emphasized that these memories might not give a perfectly true representation of how things have been, but rather of how humans *need* them to have been. In other words, experiences in the present and anticipations of future events can shape self-construed autobiographical narratives in the sense of the chordal triad of identity construal (in line with Emirbayer and Mische 1998). Still, even though memories represent a biased construction of reality, we argue that they are essential for understanding which real events and experiences act as building blocks for a positive life narrative (Fivush 2011). Analyzing the content of memories helps us identify central experiences that continue to affect individuals through nostalgia when other aspects of the respective life phase have already faded into obscurity.

Importantly, experiences that evoke nostalgia later on are not necessarily identical to experiences that evoke momentary well-being in students. Experiences that influence momentary well-being at university are likely highly situational, local, and concrete (e.g. straining exam phases or an interesting seminar) due to the low psychological distance to one's studies (in sensu Construal Level Theory; Trope and Liberman 2010). In contrast, alumni likely have a higher psychological distance to their studies, which could make them consider more abstract, global concepts and life circumstances (e.g. friendships; achievement; freedom) when construing pleasant memories (Schwarz, Kahneman, and Xu 2009). Self-Determination Theory provides a valuable framework for identifying such broad factors which likely affect past well-being. Thus, the current study builds on Self-Determination Theory to provide insights into the foundation of nostalgia in the context of memories about university.

Self-Determination Theory and affective charges of autobiographic memories

Self-Determination Theory is an organismic meta-theory on human behavior and personality development (Ryan and Deci 2017). The theory postulates a variety of factors that influence motivation,

social integration and well-being. Researchers have proposed to divide the theoretical framework of Self-Determination Theory into six mini-theories (Ryan and Deci 2019). Here, we investigate the construal of autobiographic memories through the lens of one of these mini-theories, namely Basic Psychological Needs Theory (BPNT). The core tenet of BPNT is that an optimal facilitation of *psychological well-being* (i.e. an orientation towards growth and self-acceptance; Ryff 2014) and *subjective well-being* (also referred to as happiness, Howell et al. 2011) depends on whether individuals feel that they can act in line with their three basic psychological needs for *autonomy* (i.e. relative freedom to choose/control one's own course of action), *competence* (i.e. ability to master difficult challenges) and *relatedness* (i.e. existence of deep social bonds; Ryan and Deci 2017). In other words, the satisfaction of these basic psychological needs facilitates positive emotions and a generally positive outlook on life.

While associations between need satisfaction and psychological functioning have been shown in a plethora of environments (Milyavskaya and Koestner 2011), the vast amount of research was conducted with university student samples (e.g. Levesque et al. 2004; Turkdogan and Duru 2012). Specifically, students in study programs that offer meaningful freedom of choice experience more autonomy and in turn increased study satisfaction as well as reduced test anxiety compared to students enrolled in study programs with few choices (Janke and Dickhäuser 2013). Furthermore, generalized feelings of competence such as self-efficacy are associated with increased retention (DeWitz, Woolsey, and Walsh 2009). Finally, relatedness predicts both short-term study satisfaction and dropout intentions (Suhlmann et al. 2018) as well as long-term health of students (Walton and Cohen 2011).

Basic psychological needs theory and nostalgia: the role of need satisfaction

Given that momentary need satisfaction influences whether current experiences are perceived as pleasant or unpleasant, recollections of pleasant experiences may also be characterized by notions of need satisfaction. In line with this assumption, prior studies have shown that the degree to which important autobiographic memories are perceived to reflect need satisfying experiences predicts feelings of self-acceptance and purpose in life (Philippe et al. 2011) as well as positively affects the development of general well-being (Houle and Philippe 2017).

However, in prior research, memory content has been predominantly evaluated by asking study participants to rate the degree to which their memories indicated satisfaction of basic psychological needs (e.g. Houle and Philippe 2017; Lekes et al. 2014; Philippe et al. 2011). As a consequence, assimilation effects might have occurred, in the sense that the evaluation of need satisfaction may have been influenced by the valence of the recalled memory (Bless and Schwarz 2010). Additionally, participants could also have been prompted to indicate need satisfaction due to demand characteristics. This could lead to researchers overestimating the relevance of basic psychological needs as content of pleasant memories. To solve this conundrum, it is essential to disentangle the recollection process from the evaluation of the memories, which should not be done by the study participants themselves to prevent assimilation effects and survey-based prompts that connect pleasant memories to need satisfaction.

Furthermore, it remains an open question as to whether all basic psychological needs are equally contributing to pleasant recollections of the university years. Potentially, alumni's pleasant memories could exclusively center on feelings of competence, because attending university has the clear purpose of facilitating learning in a specific field. In contrast, relatedness and autonomy during that time could be less central for a positive narrative about personal growth at university. Moreover, content bound to aspects of life at university (e.g. teaching, course content, preparation for exams) that are not directly tied to need satisfaction could also be prominent in pleasant memories of alumni. As such, we think that it is crucial to explore the content of pleasant memories of alumni within and beyond the boundaries of BPNT.

Basic psychological needs theory and regrets: the role of need frustration

While studies on basic psychological needs have mostly focused on need satisfaction, contemporary research increasingly aims to expand the literature by providing evidence on the importance of *need frustration* (i.e. direct threats to the basic psychological needs; Bartholomew et al. 2011). Need frustration (also labeled need thwarting) should not be understood as the mere opposite of need satisfaction. This can easily be exemplified by contrasting belonging uncertainty at university (low/uncertain satisfaction of the need for relatedness) to bullying or exclusion by other students (thwarting of the need for relatedness). While systematic research on the effects of need frustration on psychological functioning is just emerging, first results within student populations have shown that need frustration predicts students' disengagement (Jang, Kim, and Reeve 2016) as well as indicators of ill-being such as experiences of anxiety and depression (Cordeiro et al. 2016).

References to need frustration/thwarting can be found in contributions on autobiographic memories as well. However, this factor is never truly operationalized as a separate score but rather indicated by the inverse of the applied need satisfaction measures (Houle and Philippe 2017; Lekes et al. 2014). Still, specific research into the content of autobiographical regrets might inform further reflections into whether need frustration is an important characteristic of unpleasant memories. In line with Self-Determination Theory, regrets can be regarded as lost opportunities or in other words: 'a reflection of where in life people see opportunity, that is, where they see the most tangible prospects for change, growth, and renewal' (Roese and Summerville 2005, 1284). This closely ties regrets to acts of omission (self-inflicted limitations of one's autonomy). In fact, such omissions more often result in regrets than engagement in actions (Gilovich et al. 2003; Rudert et al. 2015). Yet autonomy is not the only basic psychological need that can be linked to regrets. Regarding frustration of the need for competence, regrets tied to career and education represent the most prevalent regret categories in qualitative investigations (Lecci, Okun, and Karoly 1994). Nevertheless, the (negative) affective intensity of regrets tied to frustration of the need for relatedness is stronger than the affective intensity of regrets that are merely tied to one's work (Morrison, Epstude, and Roese 2012). These findings indicate a high salience of need frustration within unpleasant memories. However, further systematic research into the association between a negative valence of memories and need frustration is needed. Consequently, another major goal of our research is to investigate whether need frustration indeed characterizes unpleasant memories of university alumni.

Research aims

In the present contribution, we investigate the content of pleasant and unpleasant memories of university alumni. To understand how alumni construe their past studies, we relied on narrative inquiries. We analyzed memory content that was provided by alumni in their own words, as such qualitative data allows for important insights on how alumni retrospectively assign meaning to their time at university (Savin-Baden and Niekerk 2007). We assumed that notions of autonomy, competence, and relatedness would characterize pleasant memories of alumni, whereas unpleasant memories would be characterized by content indicating the frustration of these needs. To investigate our assumptions, we relied on the judgement of independent raters, who evaluated whether participants' memories contained any indication of need satisfaction or need frustration. This procedure was meant to reduce assimilation effects that may occur when asking alumni to rate their own memories regarding need satisfaction.

Investigating whether autobiographical memories are characterized by need satisfaction and need frustration represents a theory-guided confirmatory approach to life narratives. We supplemented such analyses with additional exploratory analyses more in line with the idea and methods of grounded theory. This was meant to provide a deeper open-minded understanding of memory content emerging within the pleasant and unpleasant memories of alumni.

Method

We used data from an online survey that was distributed among alumni of a public German university who had completed their bachelor's degree. The university has a focus on social and economic sciences and around 11,000 students (medium size for a German university). The university city has about 300.000 inhabitants and is situated in a large metropolitan area. We contacted 1091 alumni of one cohort (about 50 percent of the total cohort), who had participated in a prior study (Janke 2020) and had given their permission to be contacted again for further survey studies. The survey included two open questions regarding pleasant and unpleasant memories about participants' time at university that we developed for the purpose of this study: 'Is there something that makes you particularly happy when looking back at your bachelor studies?' (indicating pleasant memories) and 'Is there something that you particularly regret when looking back at your bachelor studies?' (indicating unpleasant memories). Both questions were optional. Importantly, there were no questions that explicitly inquired information about need satisfaction or need frustration within the survey.

Sample

In total, 263 alumni took part in the survey (response rate = 24.1 percent; 63.1 percent female; M_{age} = 23.95 years; M = 2.14 semesters since the end of the bachelor studies). The participating alumni had originally enrolled themselves in social science (25.8 percent), business (22.6 percent), humanities (22.4 percent), economics (13.3 percent), law (7.7 percent), computer sciences (4.0 percent), and mathematics majors (4.0 percent). Note that in Germany, 61.4 percent of all students within the higher education system are enrolled at a university (compared to other institutions). Our sample contained more women compared to the overall gender distribution of university students in Germany (51.8 percent women). Possibly, this is because some subjects with typically strong male representation were not taught at the investigated university (e.g. engineering, which accounts for 26.8 percent of the total student population in Germany; for further information on this population see Statistisches Bundesamt 2020).

The vast majority of participants had successfully completed their bachelor studies (94.3 percent). A minority of 5.7 percent had quit their study program without obtaining a bachelor's degree. About 78.7 percent of the participants were currently enrolled in a master program, 11.8 percent were working, 5.0 percent were enrolled in a different bachelor program, 2.3 percent were unemployed, and 1.2 percent were obtaining a PhD. About half of the alumni who were still in a higher education setting had stayed at their original university (50.4 percent). 108 alumni responded to the question about pleasant memories and 112 alumni responded to the question about unpleasant memories. 86 alumni answered both questions, 22 only responded to the question about pleasant memories and 26 only responded to the question about unpleasant memories.

Procedure

Two raters coded the responses in three steps. In the first step, the raters identified whether the response indicated a memory (i.e. remembrance of the past) about alumni's bachelor studies at universities rather than thoughts about the present or other life phases. In the second theory-guided confirmatory step, the raters evaluated in a sequential coding procedure whether the obtained memories included references to basic psychological needs. In the third exploratory step, the raters developed additional categories to categorize the material (i.e. grounded theory approach). The raters then reapplied the sequential coding procedure for both pleasant and unpleasant memories. Details about the three coding steps and the sequential coding procedure (see also Bakeman 1997) as well as the full final coding scheme can be accessed as open material under https://osf.io/f3wuc/

Results

The raters concluded that 88.9 percent of the responses about pleasant memories were valid (in total 96 answers), while an additional 6.5 percent (7 answers) indicated unpleasant memories. From the responses on unpleasant memories, 95.5 percent (107 answers) were valid and no answers indicated pleasant memories. Combined with the seven answers indicating negative experiences from the question on pleasant recollections, 114 participants recalled unpleasant memories. The remaining answers did not indicate personal memories but rather suggestions how to improve the studying conditions at university (10 instances). Overall, the valid answers were rich in content. On average, the raters assigned 2.29 content categories ($SD = 1.29$) to pleasant recollections and 1.72 content categories to unpleasant recollections ($SD = 1.05$).

Content of pleasant memories

Taken together, 62.5 percent of the pleasant recollections included references to at least one of the three basic psychological needs. One percent/person referred to all three psychological needs in her recollections, whereas 14.6 percent of the participants mentioned two psychological needs.

Recollection of Relatedness. Responses were coded as indicating recollections of relatedness when they referred to experiences of belongingness and/or experiences of strong relationships with important persons or groups (interrater reliability: Cohen's $\kappa = .92$). Feelings of relatedness were highly prevalent in pleasant memories about one's time at university, with 44.8 percent of the sample reporting memories tied to this need. While the content had to refer to past experiences to be considered as a valid memory (e.g. 'I like to remember the times with my fellow students and the fun we had and how we became close friends'; this and all following examples are translations from German to English), we could also observe that experiences of relatedness in the past sometimes had lingering effects bolstering relatedness in the present (4 instances; e.g. '[I remember] *my circle of friends I still stay in contact with*').

Recollection of Competence. Responses were coded as indicating recollections of competence when memories referred to experiences of mastery in study-related tasks and/or the ability to solve study-related problems by oneself and/or personal growth in competencies that are important to the alumni ($\kappa = .93$). If answers referred to the development of skills that were clearly not important to the alumni themselves, these answers were not coded as indicating feelings of competence. In sum, 17.7 percent of the provided memories included notions of competence (e.g. 'I grew with the challenges and I am now less afraid about starting something new').

Recollection of Autonomy. Responses were coded as recollections of autonomy when memories referred to self-determination and/or freedom of choice regarding one's actions. Experiences of autonomy (e.g. 'My time at university was exciting because everything was new and it was my first step towards personal independence') were recalled about as frequently as experiences of competence within pleasant memories (16.7 percent; $\kappa = .93$).

Additional Content of Pleasant Memories. Besides the recollections of need satisfaction, the raters identified nine additional content categories within pleasant memories. Most prevalent were notions about university services, teaching and teachers, as well as study content. A full list of the frequency and content of the additional categories as well as exemplary content of the corresponding memories can be found in Table 1.

Three of the additional categories show a certain degree of overlap with need satisfaction. Recollections of *personal agency* (10.4 percent of all pleasant memories) refer to experiences of personal initiative and self-initiated action, which is similar to experiencing autonomy. However, statements indicating agency (e.g. 'The experiences that I derived from my voluntary work in my student initiative were often more valuable than my courses') do not necessarily reflect meaningful choice nor direct referrals to feelings of self-determination. Particularly, this category refers to actions that *could have led* to feelings of autonomy, although it is uncertain whether they really *did*. When

Table 1. List of the categorized content of pleasant memories ordered by frequency.

Category	Content	N	Freq.	κ
Relatedness	**Belongingness, deep relationships with important persons or groups**	**43**	**44.8%**	**.92**
University services	Activities at and around campus, administration, student services	43	44.8%	.92
Teaching/ Teachers	Quality of teaching, exams, fairness, teacher support	26	27.1%	.95
Study content	Content of courses, practical relevance, structure of the study program	19	19.8%	.94
Competence	**Mastery in study-related tasks, personal growth in competencies that are important to oneself**	**17**	**17.7%**	**.93**
Autonomy	**Self-determination, (positively experienced) freedom of choice regarding one's actions**	**16**	**16.7%**	**.93**
Semester abroad	Experiences abroad	16	16.7%	.96
Personal agency	Personal initiative to engage in extracurricular courses or activities, self-initiated actions that led to deeper learning	10	10.4%	.90
City	Standards of living, opportunities for leisure time activities	9	9.4%	.89
Merit for job market	Prestige of the university, preparation for work tasks	9	9.4%	1.00
Student body	Social climate, personality/interests of other students	7	7.2%	.93
Personal growth	Self-ascribed growth in personality and character	5	5.2%	.90

Note. Freq.: Frequency indicates percentage of answers containing respective content. Basic psychological needs are marked in bold. An expanded table including exemplary memories is available under https://osf.io/f3wuc/

including these statements as indications of autonomy (liberal definition), perceived autonomy was more prevalent in pleasant memories than the more conservative coding strategy suggests (24.0 percent of pleasant memories are characterized by recollections of autonomy and/or personal agency).

The category *student body* refers to recollections of the social climate at campus. This category contained content that could contribute to relatedness, without the alumni clearly indicating that this was the case (e.g. '[I remember] *the campus spirit*'). When coding all respective answers as indications of feelings of relatedness, 46.9 percent of the positive memories were characterized by recollections of relatedness and/or student body.

Finally, *personal growth* refers to pleasant memories on growth in character and personality rather than in abilities (competence), social networks (relatedness) or personal freedom (autonomy). While personal growth is likely influenced by need satisfaction (Ryan and Deci 2017), it cannot be simply attributed to one singular need.

Content of unpleasant memories

Overall, 46.9% of the unpleasant memories included references to basic psychological needs. None of the alumni reported need frustration in all three needs and only three alumni reported need frustration of two needs.

Recollection of Impaired Autonomy. The raters coded responses as indicating impaired autonomy when memories referred to diminished self-determination and/or freedom of choice and/or factors limiting one's freedom of action. Importantly, lack of freedom had to be experienced negatively (e.g. '[I had] hardly any freedom of choice or individual support: many seminars were assigned to me no matter if I was interested or not'). Impaired autonomy was the most prominent content among all possible categories that the raters coded regarding unpleasant memories (34.2 percent; κ = .98).

Recollections of Impaired Competence. The raters coded statements as indicating impaired competence when they were characterized by experiences of failure in study-related tasks and/or the feeling of not being able to cope with study-related problems by oneself. Only a few responding alumni had such notions (8.8 percent; κ = .85). The few statements indicated that such lack of mastery was experienced as personal failure (e.g. 'I regret a bit that despite strong dedication, diligence and motivation, I achieved bad grades in some exams').

Table 2. List of the categorized content of unpleasant memories ordered by frequency.

Category	Content	N	Freq.	κ
Impaired autonomy	**Diminished self-determination, impaired freedom of choice/action**	**39**	**34.2%**	**.98**
Study content	Content of courses, practical relevance, structure of the study program	34	29.8%	.94
Teaching/Teachers	Quality of teaching, exams, fairness, lack of teacher support	29	25.4%	.97
Lack of personal agency	Self-ascribed omissions to use personal freedom	21	18.4%	.92
External pressures	Distress, time pressure, financial hardships, competition	20	17.5%	.91
University services	Activities at and around campus, administration, student services	13	11.4%	.92
Impaired competence	**Failure in study-related tasks, inability to cope with study-related problems**	**10**	**8.8%**	**.85**
Bad preparation for job market	Preparation for work tasks and applications	9	7.9%	1.00
Student body	Attitudes of other students, (lack of) diversity, intergroup conflicts	8	7.0%	.88
Impaired relatedness	**Negative relationships with other persons or relevant groups, feelings of loneliness and/or mobbing**	**7**	**6.1%**	**.93**
Choice of major	Unhappiness with decision	5	4.4%	.90
No abroad semester	Lack of opportunity for abroad semester	1	0.9%	1.00

Note. Freq.: Frequency indicates percentage of answers containing respective content. Basic psychological needs are marked in bold. An expanded table including exemplary memories is available under https://osf.io/f3wuc/

Recollections of Impaired Relatedness. Statements indicating impaired relatedness were characterized by experiences of negative relationships with other persons or relevant groups and/or experiences of loneliness and/or bullying. While recollections of relatedness were prominent in pleasant memories, this was not the case for unpleasant memories. Only very few individuals indicated such feelings of loneliness or rejection (6.1 percent; κ = .93). For those individuals, however, the time at university seemed to be a particularly painful memory (e.g. 'I had no friends and was often very lonely and on my own').

Additional Content of Unpleasant Memories. Once again, study content and teaching emerged among the most important content categories of unpleasant memories beyond need frustration (see Table 2 for details regarding frequency), comparable to the findings for pleasant memories. Furthermore, a lack of personal agency was reported as a regret by a significant proportion of the alumni that answered the question about unpleasant memories. This does not necessarily imply that individuals lacked personal freedom or opportunities for self-determined action, but rather that they did not use these opportunities (e.g. 'I should have enrolled myself in more voluntary courses'). While not directly indicating impaired autonomy (albeit tied to this experience, see Deci and Ryan 2016), external pressure through competition or financial insecurity was also quite frequently mentioned in unpleasant recollections (17.5 percent). When coding both acts of omission through a lack of agency as well as external pressures as memories indicating impaired autonomy (liberal coding), about 56.1 percent of the statements indicate frustration of this need as content of unpleasant memories. Additionally, unpleasant compositions of the student body (e.g. 'Personal conduct between students of different majors was disrespectful') could indicate mild experiences of impaired relatedness (7.0 percent of the unpleasant memories indicated such experiences).

Discussion

The aim of this contribution was to investigate whether pleasant and unpleasant memories of alumni are characterized by notions of need satisfaction and need frustration. Different from previous research, we relied on independent raters to code these memories in a multi-staged process rather than on self-report procedures. In line with our assumptions, many pleasant and unpleasant recollections of university alumni could be characterized by satisfaction and frustration of autonomy, competence, and relatedness. Pleasant memories referred more frequently to feelings

of relatedness compared to feelings of competence or autonomy. In unpleasant or regretful memories, frustrations of autonomy were mentioned more frequently than frustrations of relatedness or competence. We also investigated whether the memories included additional themes. Some of this additional memory content shows overlap with the investigated basic psychological needs (personal agency, student body, pressure, personal growth). The respondents also frequently mentioned teaching and study content, both in a positive and negative sense.

Theoretical implications

In line with Basic Psychological Needs Theory, our results suggest that alumni construe their past at university in terms of need satisfaction and need frustration. Memories about social connectedness on campus, but also about achievement and personal freedom still satisfy alumni when reflecting on their time at university. We further extend research on the importance of basic psychological needs for individuals' autobiographic memory by showing that need frustration, especially autonomy frustration, is often part of alumni's unpleasant memories. Experiencing the learning environment at university as strongly controlling lingers in memory, even after alumni have obtained their bachelor's degree. Interestingly, this was also true for self-imposed restrictions of actions (i.e. lack of personal agency). This finding directly links our research to existing works on regret, which have shown that failures to act are regretted to a greater extent than actions (Gilovich et al. 2003; Rudert et al. 2015). Presumably, this is because it is relatively easy to engage in counterfactual thinking about missed opportunities compared to counterfactual thinking about actions that had clear consequences. While the latter will only result in thoughts about prevented consequences of the respective action, counterfactual thinking about omissions can lead to far-fetched fantasies about alternate life courses and increase rumination (Gilovich et al. 2003).

The coding categories derived from the exploratory analyses allow us to extend our perspective to other facets of the Self-Determination Theory framework beyond BPNT. Particularly, the finding that personal growth was an important content of pleasant memories reflects that humans assign high importance to striving for self-actualization, a core postulate of Self-Determination Theory (Ryan and Deci 2017; 2019). Furthermore, the content of pleasant and unpleasant memories can be distinguished by whether individuals attribute the experience to an internal vs. external *locus of causality* (i.e. to perceive themselves as the origin vs. the subject of an experience; Ryan and Deci 2017). Specifically, personal agency, that is, a strong internal locus of causation, emerged as an important category within pleasant memories. In contrast, lack of agency and external pressures, that is, a strong external locus of causation, were often regretted. This indicates that whether individuals feel that they have been in control of past experiences is directly linked to whether these experiences are remembered pleasantly or unpleasantly.

A methodological strength of our research is that we relied on independent raters instead of letting participants code their own recollections with rating scales on need satisfaction (e.g. as in Houle and Philippe 2017; Lekes et al. 2014; Philippe et al. 2011). Thus, the observed importance of basic psychological needs in the recollections is not a result of alumni reacting to the content of presented rating scales or other material. Still, our findings are in line with those of prior research, which further supports the underlying assumption that individuals indeed construe their memories in terms of basic psychological needs even if this content is not prompted.

Limitations and future research

While our research shows that the frequency of content indicating need (dis)satisfaction can differ when comparing pleasant and unpleasant memories, we hesitate to derive conclusions about the relative importance of singular needs from the relative frequencies reported in our sample. This holds especially for the relative importance and frequency of content indicating need frustration in unpleasant memories. The majority of our participants had successfully concluded their bachelor's

degree. Thus, the collected memories reflect the experiences of individuals that had successfully adapted to university. In contrast, students experiencing strong need frustration during their studies might be more likely to drop out and could be unwilling to participate in a survey reminding them of these frustrations. This selection effect could explain why basic psychological needs were descriptively mentioned more prominently in pleasant than in unpleasant memories.

Assuming such a selection effect, the low frequency of memories regarding impaired relatedness and competence could paradoxically even hint at the importance of need satisfaction in those areas for a successful completion of one's studies. For instance, references to relatedness were rare in unpleasant memories, albeit prior research showing dramatic effects of belonging uncertainty for students' well-being and health (Stephens et al. 2015; Walton and Cohen 2011). In contrast, the relatively frequent indication of a lack of autonomy in unpleasant memories of alumni could potentially indicate that autonomy is of lesser importance for students' ability to successfully conclude their studies compared to relatedness and competence. Yet, while students may complete their studies despite experiencing a lack of autonomy, it is important to note that achieving such an objective is not necessarily the same as achieving psychological growth that lingers on in memory. In contrast, alumni might remember the lack of autonomy as something that held them back and in retrospect still evokes regret in them.

Future studies might further explore the role of need frustration within autobiographic memory of other (less successful) student populations, particularly university dropouts. This would allow to investigate whether memories about the university years form a psychological resource even for those who failed to adapt to this learning context or whether dropouts will be less likely to form any pleasant memories about their time at university. It would also be of interest to further investigate the memories of alumni who left university for good. Many of the alumni in our study were enrolled in master programs at the time of the survey, and thus still students. While their bachelor studies might represent a concluded time span, psychological distance to this time might be smaller than for individuals who have joined the workforce and look back at their time at university several years later. Investigating recollections characterized by higher distance would provide additional insights which experiences transcend long periods and contextual changes and which memories simply fade away. Relatedly, there might be differences between alumni from different professions regarding their construal of the university years and the experiences that help them cope with current job demands.

The present study is not suitable to address questions about whether and how memory content affects long-term psychological functioning because it is characterized by a small sample size and answering the questions on pleasant and unpleasant memories was voluntary. Especially the latter likely limits possibilities to detect associations of certain themes with well-being because answering the respective questions itself reflects the accessibility of pleasant or unpleasant feelings. We also did not assess the strength of need satisfaction or frustration within the recollected memories (mild, medium, strong), which is likely more accessible to the participants themselves. Additionally, our results reflect a selective population of alumni enrolled at a specific German university with a strong focus on social and economic sciences. Further studies drawing from a vast set of countries and higher education institutions are needed to further investigate whether our conclusions can be generalized to other populations. In sum, we think that our research can be interpreted best within a strong network of qualitative and quantitative studies on the importance of memories bound to the university years.

Practical implications

As we focused on narratives construed by our participants rather than on factors that prospectively influenced these narratives, recommendations for higher education action can only be inferred with a high amount of caution. It has to be noted, though, that the investigated memories centered more prominently on experiences influenced by actors inside of university (university services, teachers,

student body) than outside of academia (the city, experiences abroad, job market). This implicates the possibility that higher education practitioners can positively affect the latter life narratives of their students. However, measures that could contribute to alumni remembering their time at university more nostalgically (e.g. need-supportive teaching) have to be investigated in prospective study designs.

Furthermore, it is yet unclear whether unpleasant memories bound to the university years always hinder subsequent psychological growth (Lecci, Okun, and Karoly 1994). To a certain degree, unpleasant experiences and memories might be inevitable characteristics of academic growth and identity transformation (Lehmann 2014; Reay, Crozier, and Clayton 2009). Consequently, it could be short-sighted to shape higher education institutions in ways that prevent alumni to encounter negative experiences at all cost. Nevertheless, regrets about a lack of academic freedom might reflect that alumni did not encounter critical opportunities for identity development. This would make it even more important for universities to provide the necessary academic freedom that allows students to both create nostalgic memories as well as face and overcome the challenges on their path to become self-determined academics.

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