Health-Related Quality of Life, Success Probability and Students' Dropout Intentions: Evidence from a German Longitudinal Study

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Abstract

One in three students suffers from at least one common mental disorder highlighting the high prevalence of health issues in higher education. At the same time, every third student drops out of university without achieving their degrees. Nevertheless, connections between health and students' dropout behavior have hardly been investigated. Grounding on value-expectation theory, this article argues that the students' health-related quality of life (HRQoL) alters the impact of their self-assessed success probability in graduating on their dropout intentions. To examine the research question, data from the LAST project, which surveyed a German undergraduate student population over a period of four semesters (N=7,169), were used applying fixed effects regressions, and interaction effects. Analyses uncover that the students' mental health status is in fact linked to their intentions to drop out of university. Furthermore, an interaction effect of mental HRQoL and success probability could be confirmed. The findings suggest that universities should adopt better health promotion policies that bring together both individual health needs and higher education's interest in successful graduates.

Keywords Dropout intentions · HRQoL · Success probability · Higher education · Interaction effects · Fixed effects

Introduction

Links between education and health have been highlighted multiple times in sociology and health sciences. In general, a person's health is strongly correlated with their education level, with the better-educated showing better health status (Bradley & Green, 2013; Easterbrook et al., 2016). Higher education levels are associated with improved access to relevant health information and resources, a greater awareness of health issues and a better health-

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related behavior (Lawrence, 2017). At the same time, it is short-sighted to assume only unidirectional influences in the relationship between the two factors. Health is an important basic prerequisite for people's ability to function and perform. It is a central but finite and (at least temporarily) consumable resource, and thus fundamental for building human capital (Doré & Clar, 1997; Eisenberg et al., 2009). It represents a capability but can equally become a restriction.

A key parameter that could be affected by health conditions is university students' dropout intentions. In the OECD countries, every third student leaves university without completing their degrees establishing attrition as a second normal mode alongside graduation (OECD, 2019). Dropout intentions can be interpreted as an early warning signal for an impending dropout (Blüthmann, 2011). For the individual, various negative effects are associated with dropping out of university, as there are risks of negative stigmatization on the labor market and non-academic professions are associated with lower average salaries and higher risks of unemployment (Hällsten, 2017; Neugebauer & Weiss, 2018; Pfeiffer & Stichnoth, 2020). This makes it important to examine individual, and social predictors for dropout behavior.

Despite a broad scope of determinants of students' dropout intentions having been identified during the last 50 years (Heublein, 2014; Spady, 1970; Tinto, 1975), potential influences of students' health have been largely neglected. This is especially true for physical health. Mental health has come into research focus sporadically over the past 15 years (Eisenberg et al., 2009; Hjorth et al., 2016; Lipson & Eisenberg, 2018). However, existing research is predominantly cross-sectional and concentrates on the impact of specific illnesses rather than the general mental health status. This sparse research basis is a major shortcoming since health issues, especially those of mental health, are known to be highly prevalent in German and international higher education (Auerbach et al., 2018; Grützmacher et al., 2018).

This article addresses this research gap by examining longitudinal effects of general physical and mental health (measured by health-related quality of life) on students' dropout intentions. Moreover, influences of health are expected to be effective in several ways, including, most importantly, an impact on the effect of self-assessed success probability in graduating on dropout intentions. As suggested by findings on the effects of academic self-efficacy on dropout intentions (Chemers et al., 2001; Schneider & Preckel, 2017), higher expectancy should correlate with lower dropout intentions. This paper argues that this negative effect of success probability is altered by health status. With declining mental and physical health, the effect should become stronger since doubts about one's prospects of success and health issues accumulate. Therefore, a special focus of this paper will be on examining an interaction effect of health and success probability on dropout intentions. To the author's knowledge, this has not been analyzed in higher education research to date.

The theoretical basis, on which the central assumptions of the paper are derived, is value-expectation theory (Eccles & Wigfield, 2020; Wigfield & Eccles, 2000). Data are drawn from the LAST dataset, which surveyed students at a medium-sized German university over a total of four semesters ($N=7,169$). To examine the research question, fixed effects panel regressions, and interaction effects were calculated. In addition to its' contribution to higher education research, the article provides several practical implications for dropout prevention and intervention. Effective measures to reduce high dropout rates would be highly relevant and even financially beneficial to universities since graduate numbers directly affect state funding in the German educational system (Jaeger, 2008).

Theoretical Background

To drop out of university is a far-reaching educational decision for a student. Leaving higher education without a degree means a complete reorientation of one's professional career and represents a decisive event in one's own biography. In the long term, it correlates with lower average salaries and higher rates of unemployment compared to graduates (Neugebauer & Weiss, 2018; Neugebauer et al., 2019; Pfeiffer & Stichnoth, 2020). For these reasons, the decision is almost never made spontaneously but is the result of a differentiated weighing process in which the costs and benefits of the respective options for action are carefully determined and compared. A theory that takes up these inner balancing processes is value-expectation-theory (Eccles & Wigfield, 2020; Wigfield & Eccles, 2000). Adaptations of the theory in the field of educational sociology have been made, for example, by Erikson and Jonsson (1996), Breen and Goldthorpe (1997), Esser (1999), and Stocké (2007). In the following, the main factors that all approaches use to explain the logic of educational decisions are described.

Value-expectation Theory

According to value-expectation theory, individuals compare the different options of action in regard to their expected utility value (EU) which they seek to maximize. To determine the respective EUs, three parameters are decisive: (a) the costs associated with the respective educational option, (b) the benefits that one receives from a successful completion, and (c) the probability that the educational goal aimed at can also be achieved (Becker & Hecken, 2007; Maaz, 2006). While costs encompass both direct costs (e.g. tuition fees, costs of living, time and energy expenses) and indirect costs or opportunity costs (e.g. forgone labor market income, reduction of established social contacts, giving up early financial independence), a wide range of factors can be perceived as benefits from studying: prospects of higher salaries, a higher social status linked to the respective degree, establishing new social contacts, getting in touch with new ideas, etc. The success probability or expectancy is basically the students' prediction about their own ability to complete their studies. It depends on the students' academic self-concept, i.e. the self-assessment of their own academic skills, and also on grade performance (Ethington, 1990; Stinebrickner & Stinebrickner, 2008). If conviction for future graduation is lacking, the desired benefits recede into a far distance. Erikson and Jonsson (1996) have formalized the weighing process in an equation. The EU of graduating is calculated by subtracting the costs (C) of the expected benefits (U), whereby the benefits are weighted by the assumed success probability: EU (graduating)=p*U (graduating)-C (graduating). In the same way, the value for the respective alternative is calculated: EU (alternative)=p*U (alternative)-C (alternative). The individual finally decides for the option from which they expect the largest utility value (EU). Important here is that the respective assessments of all three parameters are not universally transferable but ground on subjective evaluations of the individual. These in turn are shaped by previous experiences, the perspective of the social environment etc.

Health and HRQoL

Meanwhile, the concept of health applied in this article will also be briefly introduced. Health, following the definition of the World Health Organization (WHO), implies not only the absence of pain, harm, or disease, but also general well-being (WHO, 2006). It manifests itself through physical and mental health, with the two factors inextricably intertwined (Prince et al., 2007). By explicitly including well-being in its definition, the WHO has added an element of subjective experience to the multi-dimensional concept of health. In public health research, this is addressed by the implementation of health-related quality of life measures (HRQoL) which cover both physical and mental aspects of well-being (Paro et al., 2010).

Expected Effects of Physical and Mental HRQoL on Students' Dropout Intentions

This paper hypothesizes that the state of health, physically and mentally, influences university students' dropout intentions. Generally, poor *mental health* directly affects both cognitive (Bahmani et al., 2018; Grøtan et al., 2019) and non-cognitive abilities (Eisenberg et al., 2009; Wyatt & Oswalt, 2013) in a negative manner. Therefore, both academic engagement and academic performance are likely to be negatively affected. A reduced performance and a declining motivation, in turn, will lead to poorer educational outcomes including higher risks for failing examinations and a lower GPA. Both of these factors go along with higher dropout intentions. Moreover, poor mental health could undermine students' confidence in their ability to perform and jeopardize their perception of the chance to successfully complete their studies, i.e. the students' success probability (Eisenberg et al., 2009). The students may feel that they cannot meet the challenges of tertiary education. Following value-expectation theory, a decreased assessment of success probability diminishes the EU of graduating. Especially if the latter falls back behind the EU of the respective alternative, dropout intentions should arise or be strengthened. Therefore, mental health should be negatively correlated with students' dropout intentions.

Poor *physical health* is expected to exert influences in a similar direction. In general, cognitive abilities can also be affected by physical health (Shaw et al., 2015). Additionally, physical health problems should most likely prevent students from attending courses which could adversely affect their academic performance and their social integration into the student body. Both of these factors are strongly negatively correlated with dropout intentions. As in the case of mental health, physical health problems are thus expected to correlate with lower success probability. Furthermore, career prospects are perceived as lower especially when long-term or chronic illnesses are present. This can also be true for chronic mental disorders. In individual cases, illnesses could also influence individual life expectancy, which raises the question of whether it makes sense to invest several years in a university degree program. Applying value-expectancy theory, it could be stated that the expected benefits of a university degree would be rated lower, which in turn would have a negative effect on the expected utility value. Thus, physical health is also expected to negatively correlate with students' dropout intentions.

Expected Interaction Effect of HRQoL and Success Probability

Furthermore, it is argued that the relationship between health and dropout intentions is also driven by an *interaction effect* of health and the students' success probability. The negative effect of success probability on dropout intentions is assumed to be altered by both physical and mental health. This shall be further illustrated: given a high success probability, dropout intentions should not be further influenced by the students' health status since their confidence in their own resources and abilities is strong and intact, regardless of their health situation. While academic performance may drop off a little, this does not have a serious impact on their academic self-efficacy. By contrast, in case of low expectancy, poor health is expected to be perceived as another obstacle that the students must additionally deal with. Health stresses and serious doubts about their prospects of graduation could accumulate and evoke feelings of being overwhelmed, to which considerations of dropping out would be a likely reaction. It is thus assumed that the impact of success probability on students' dropout intentions is heterogenous as it should depend on the individuals' respective health status.

Summary: Research Purpose

To sum it up, the research purpose of this article is to investigate the impact of students' physical and mental HRQoL on their intentions to drop out of university with a special focus on a potential interaction effect with the self-assessed success probability in graduating. A longitudinal perspective is adopted to examine effects of changes over the course of the study. Specifically, the analyses are guided by the following research questions:

RQ 1a: Are increases in physical HRQoL associated with decreasing students' dropout intentions?

RQ 1b: Are increases in mental HRQoL associated with decreasing students' dropout intentions?

RQ 2: Are increases in self-assessed success probability in graduating associated with decreasing students' dropout intentions?

RQ 3a: Do increases in physical HRQoL alter the effect of increasing success probability on students' dropout intentions?

RQ 3b: Do increases in mental HRQoL alter the effect of increasing success probability on students' dropout intentions?

State of Research

This section is organized as follows. First, findings of the general health situation of university students are described. Second, existing research to the influence of health parameters on educational outcomes is outlined. Third, the effects of the three central parameters of the value-expectation theory on students' dropout intentions are described, after which additional key predictors of university students' dropout intentions are presented. At last, the current state of research is briefly summarized.

University Students' Health

Regarding university students, findings on *physical health* are mixed. In German higher education, Grützmacher et al. (2018) state on the basis of a large-scale nationwide study that three out of four students suffer from a physical complaint at least once in a month, with pain in limbs, shoulder, neck, and back as the most frequently indicated symptoms. About every second student has physical complaints at least once in a week. Grace (1997) is aiming in a similar direction with her conclusion that serious illnesses among American college students are a common issue and must be taken seriously in their magnitude. In addition, empirical research has revealed a multitude of poor health habits among university students. These comprise excessive alcohol consumption, binge drinking, poor dietary habits, cigarettes smoking, substance abuse, excessive partying, an insufficient level of physical activity, a sedentary lifestyle and adverse sleep patterns, among other things (Aceijas et al., 2017; Huang et al., 2003; White & Hingson, 2013). All these behavioral patterns can directly impair physical well-being (Kruger & Sonono, 2016). However, studies from various countries conclude that the students' physical HRQoL can be described as positive (Fallahzadeh & Mirzaei, 2012; Garrido et al., 2019; Klemenc-Ketis et al., 2011; Vaez & Laflamme, 2003). In particular, the physical role functioning of students is classified as very good, also in comparison to non-academics of the same age (Arslan et al., 2009; Pekmezovic et al., 2011). Female students rate their physical HRQoL less well than male students (Sabbah et al., 2013).

Students' *mental health*, however, has increasingly attracted attention since research reports rising numbers of students with serious mental illnesses and severe psychological problems (Storrie et al., 2010; Wyatt & Oswalt, 2013). The spectrum of common problems encompasses depression, generalized anxiety, psychotic disorders, sleeping-problems, alcohol/substance use disorders, self-harm, and in some cases even suicidal thoughts (Kitzrow, 2003; Zivin et al., 2009). Results from international studies suggest that about one third of all students screen positive for at least one common mental disorder (Auerbach et al., 2018; Ibrahim et al., 2013). In Germany, 17% of all students suffer from generalized anxiety disorder alone, and 16% show symptoms for depressive syndrome (Grützmacher et al., 2018). Additionally, mental health problems are closely correlated, frequently occur together, and turn out to be relatively persistent over time (Eisenberg et al., 2013). Zivin et al. (2009) describe that 60% of the students who reported a mental health problem at one point in time had at least one mental health problem two years later. Measurements of mental HRQoL confirm these findings for student populations: Compared to the above-average physical HRQoL, the quality of students' mental health is rated much lower, with male students again giving higher ratings than their female counterparts. Particularly low assessments are given with regard to students' vitality, emotional role functioning, and, in some cases, for the overall assessment of mental health (Arslan et al., 2009; Jamali et al., 2013; Pekmezovic et al., 2011). These and similar findings led Storrie et al. (2010) to the conclusion that the mental health status of university students can be rated as poor compared to the general population. Nevertheless, it has to be considered that the health status of individuals also depends on the national institutional framework and on the respective social and educational environment. Germany, as a country with well-developed health care, a statutory health insurance system, above-average prosperity and a comparatively high level of education, offers significantly

better framework conditions than other countries. Therefore, when comparing students' health, possible country-specific differences must be considered.

Health and Dropout Intentions

Links of health measures and dropout behavior continue to be sparsely analyzed in higher education research. This is rather surprising since studies from secondary education have shown that depression, childhood trauma and other mental disorders as well as somatic diseases among adolescents increase the risk for dropout in schools (de Ridder et al., 2013.; Dupéré et al., 2018; Esch et al., 2014). The few existing analyses show that university dropouts and mental health issues are de facto interrelated (Eisenberg et al., 2009; Hjorth et al., 2016). Psychological disorders increase the likelihood for dissatisfaction with the academic experience, doubts about whether studies are worth the effort and the likelihood for dropout intentions (Lipson & Eisenberg, 2018). Emotional health (i.e. fatigue, self-esteem and coping skills) and some aspects of social health (housing and feeling fit in at the university) have been identified as additional predictors of dropout intentions (Pritchard & Wilson, 2003, 2007). Health problems, illnesses and injuries were also reported by Glogowska et al. (2007) as main reasons for student attrition which can be particularly harmful if they occur in conjunction with other stressors. Past research uncovered correlations between students' various experiences of distress and dropout intentions. For example, financial constraints were stated as one major cause of withdrawing from higher education (Davies & Elias, 2003). Since distress is associated with negative health outcomes, health can be the decisive mediator in the relationship between perceived stress and dropout intentions (Arbona et al., 2018). For German higher education research, Klein et al. (2021) report slightly poorer health assessments of dropouts compared to graduates, which can also be interpreted as an indication for health effects. Only Tamin (2013) finds no evidence that past or current mental health issues affect students' retention. However, the author limits the analysis to patients who receive medical treatment of their diagnosed illnesses. This could represent a special subgroup of the mentally ill that is well aware of its health limitations and, perhaps, has also a special motivation to graduate despite their illness. Associations of physical health and students' dropout intentions have not been investigated as far as it is known to the author.

Contrary to the relative scarcity of research on the influence of health on students' dropout intentions, impacts on academic success have been analyzed much more frequently in the recent past. This is also highly relevant for this paper since academic success and dropout intentions are well-known to be strongly correlated (Bean, 1982; Duque et al., 2013; Piepenburg & Beckmann, 2021). Negative effects on exam grades, the grade point average (GPA), study delays, or the likelihood of study interruptions have been uncovered for depression, anxiety disorders, loneliness, eating disorders, sleep problems and for a poor self-reported overall mental health (Bahmani, 2018; Grøtan et al., 2019; Wyatt & Oswalt, 2013). Effects seem to be particularly strong if several disorders occur together (Eisenberg et al., 2009). However, again, there are almost no research results in the literature on physical health (Chow, 2010). The same is true for HRQoL measures which are only applied by DeBerard et al. (2004). The authors report significant effects of overall mental health on GPA while the physical component score only showed significant effects on a bivariate level.

Parameters of Value-Expectation Theory and Dropout Intentions

Research on the impact of the different parameters of the value-expectation theory on students' dropout behavior is rather seldom too. Schnettler et al. (2020) used multilevel regression models to analyze influences of intraindividual changes in costs, utility and expectancy on changes in dropout intentions for German undergraduate students. While changes in costs were positively related to changes in dropout intentions, there was no significant association with deviations in utility and expectancy. Similar results were reported by Perez et al. (2014) who also found that competency beliefs do influence students' grades at the following point in time, but not their intentions to leave university. Moreover, it has been shown that facing difficulties and setbacks in goal striving (as graduating) make individuals think about subjective costs and benefits of reaching their goal more frequently (Brandstätter & Schüler, 2013). In general, perceptions of costs and benefits from receiving a university degree are dynamic since students update their evaluations based on their experiences and environmental stimuli (Aina et al., 2022). Meanwhile, the impact of the individual's self-efficacy, a concept very similar to expectancy, has been examined rather frequently. Various studies have shown that academic self-efficacy is negatively linked with students' dropout intentions highlighting the importance of one's belief in their competencies (Chemers et al., 2001; Multon et al., 1991; Schneider & Preckel, 2017).

Further Influences on Students' Dropout Intentions

Generally, higher education research has identified a variety of influencing factors for students' dropout intentions over the past decades (Larsen et al., 2013; Spady, 1970; Tinto, 1975). The following section provides an overview of central predictors that have been reported to date. Some of these will also be included as control variables in this paper. A key determinant of dropout intentions is the students' motivation. Especially students with an intrinsic motivation to learn are less likely to develop thoughts of leaving university, while for the mainly extrinsic motivated the opposite is true (Liu et al., 2014; Mujica et al., 2019). Further individual characteristics affecting students' dropout intentions are gender, age, school leaving grade, personality factors, and volition strategies (Alkan, 2014; Larsen et al., 2013; Robbins et al., 2004). Another influencing factor is the students' employment, although findings on this differ. In addition to the distinction as to whether a side job is pursued or not, it also seems to be decisive in which field of activity and to what extent this work is performed (Choi, 2018; Hovdhaugen, 2015; Neyt et al., 2019). Also, the socioeconomic background is an intervening factor. Children from academic households with higher social status are not only more likely to enter higher education, but also to stay at university after enrollment (Aina, 2013).

In addition to individual characteristics, higher education research also examines the importance of the general study conditions. Here, social integration into the group of fellow students has repeatedly proven to be a strong predictor (Aina et al., 2022; Davidson & Wilson, 2014; Hadjar et al., 2022; Tinto, 1975). Students with frequent and close ties to their colleagues display higher commitment to their studies and are less likely to drop out. Furthermore, effects from organizational characteristics of the study program and the perceived teaching quality (including didactics and mentoring) have been uncovered (Chen, 2012; Farr-Wharton et al., 2018). In recent years, influences of adjacent life domains on students'

dropout tendencies have also been revealed (Cutrona et al., 1994; Pokorny et al., 2017). The decision to drop out of university turns out to be a complex and multidimensional process which extends across a longer period of time (Heublein, 2014).

Summary

To sum it up, the current state of research exhibits several limitations: Firstly, prior research mainly concentrates on the harmful influences of specific psychological disease patterns. Especially the impact of HRQoL as a measure for physical and mental well-being has been rarely analyzed yet. Secondly, potential effects of physical health are largely neglected or not considered in research. Thirdly, there is a lack of longitudinal studies taking dynamic developments over the course of studies into account. The health status of a person, physically as well as mentally, is far from stable and goes through many changes over time. Against this background, detailed analyses of the relationship on a longitudinal basis appear to be essential.

Methods

Data and Sample

The following analyses use data from the panel study 'Life Course Perspective and Dropout from Higher Education' (LAST). This research project aimed to examine the various determinants and influencing factors for university students' academic success, dropout intentions and actual dropouts, considering not only academic and individual factors, but all the different life contexts of students (e.g. family, partnerships, peer groups). In the LAST dataset, undergraduate students at the University of Oldenburg, located in Northwest Germany, were interviewed once per semester from 2017 (winter semester) to 2019 (summer semester). The University of Oldenburg is a middle-sized university with about 15,000 students currently enrolled. 56.76% of the students are female, 8.18% have a foreign nationality. Higher education in Oldenburg places great emphasis on teacher training as it is the only university in Lower Saxony that provides teacher training for all types of schools. About 37% of the students are student teachers (University of Oldenburg, 2022). From the starting cohort in the winter semester 2017/2018 (which has been the main cohort under investigation of the LAST study), 29.14% of the students dropped out of university and further 11.91% changed their major (ibid.). Therefore, the proportion of dropouts is about the same as German and OECD averages (Heublein et al., 2020; OECD, 2019).

The survey method provided that primarily first-semester and third-semester students were interviewed in the first wave. This goes back to the fact that a large proportion of university dropouts occur at the beginning of their studies (Heublein, 2014). Also, this made it possible to monitor students throughout their whole bachelor's studies since the standard study period in Germany equals six semesters. Respondents were recruited through a combination of two measures. First, the study was advertised personally during compulsory courses. Questionnaires were distributed directly in the seminar rooms. Second, online invitations were sent out to all students of the respective semesters via the university's central learning platform. In total, the LAST dataset comprises N=7,169 observations of n=4,135

different respondents, of which 44% can be considered as panel cases. The following analyses use data from all four waves.

For the specification of the sample, all respondents who took part in at least two waves were included. Participations of the same respondent do not have to follow each other directly. Surveyed persons with missing data for at least one of the variables considered were excluded from the analysis (listwise deletion). This results in a final analytic sample comprising N=4,221 observations based on the participation of n=1,607 respondents. Central characteristics of the sample structured by wave are illustrated in Table 1. The majority of the participants is female, non-migrant, part of a romantic relationship, and has a side job. Dropout intentions as the central dependent variable of this examination are generally low (overall mean=1.47 on a four-point scale). This coincides with a rather positive average evaluation of the studies: success probability and subjective benefits of graduating are estimated to be very high, whereas the subjective costs of the studies are assessed at low to medium. Moreover, success probability considerably increases in the course of the survey. Also, participants reported their social integration into the student body as well as their intrinsic motivation as above the center on the respective scales. Meanwhile, the HRQoL of the respondents is in line with previous research findings: Students' PCS exceeds the MCS

Table 1 Descriptive statistics of the sample (N=4,221)

	Range	Mean (SD)/Share (in %)			
		Wave 1 (N=1,348)	Wave 2 (N=1,219)	Wave 3 (N=967)	Wave 4 (N=687)
Dependent Variable:					
Dropout intentions	1–4	1.43 (0.55)	1.49 (0.61)	1.40 (0.55)	1.38 (0.53)
Independent Variables:					
Physical HRQoL:					
Physical role functioning	0-100	76.73 (23.93)	74.56 (25.30)	75.22 (24.21)	74.76 (24.05)
Bodily pain	0-100	77.97 (23.47)	75.16 (25.08)	76.89 (24.68)	76.09 (24.35)
General physical health	0-100	60.14 (24.25)	61.73 (24.71)	62.80 (24.37)	60.81 (23.82)
PCS (physical component score)	0-100	71.62 (19.65)	70.48 (21.02)	71.63 (20.43)	70.55 (20.07)
Mental HRQoL:					
Vitality	0-100	43.12 (21.36)	44.22 (20.92)	47.98 (21.73)	43.78 (21.10)
Social functioning	0-100	77.02 (26.08)	74.92 (27.03)	74.97 (26.83)	73.14 (25.99)
Emotional role functioning	0-100	70.21 (25.62)	67.01 (26.54)	69.04 (25.90)	66.89 (26.13)
General mental health	0-100	50.13 (19.58)	47.51 (19.37)	51.93 (19.40)	49.07 (19.95)
MCS (mental component score)	0-100	60.12 (18.31)	58.41 (18.82)	60.98 (18.92)	58.22 (18.82)
Evaluation of the studies:					
Subjective costs	1–4	2.46 (0.90)	2.40 (0.85)	2.35 (0.81)	2.36 (0.83)
Subjective benefits	1–4	3.52 (0.65)	3.53 (0.64)	3.49 (0.64)	3.56 (0.58)
Success probability	1–4	3.29 (0.57)	3.32 (0.62)	3.40 (0.60)	3.46 (0.61)
Control Variables:					
Social integration	1–4	2.93 (0.71)	2.93 (0.70)	2.93 (0.70)	2.90 (0.70)
Intrinsic motivation	1–5	3.68 (0.72)	3.58 (0.75)	3.69 (0.71)	3.70 (0.70)
Employment status: employed	0–1	51.63%	59.47%	64.12%	67.25%
Further Demographics:					
Age	17–53	22.39 (4.27)	23.42 (4.29)	23.34 (4.31)	24.34 (4.21)
Sex: female	0–1	74.41%	74.90%	73.71%	77.58%
Migration background: yes	0–1	11.42%	10.82%	10.44%	10.04%
Relationship status: in partnership	0–1	52.15%	54.14%	54.81%	56.62%

by more than 11 points on a 0-100 scale. The surveyed students (with an average age of 23) largely do not display severe physical handicaps that cause pain or restrictions in everyday activities. By contrast, remarkably poor assessments were given for vitality and general mental health confirming previous research findings. Participants estimated the occurrence of problems in these dimensions to be more than 'sometimes' on average. Over the course of studies, no clear trend of deteriorating or improving health can be identified. Standardized means of the seven subscales compared to representative measures of the German general population are provided in Table A in the Appendix (Andersen et al., 2007). It can be seen that all components reflecting the mental HRQoL are significantly below the country-specific norm-based score while the physical HRQoL is at an average level.

Analytic Approach

Data were analyzed using the free software R (version 4.0.3). The examination was performed by calculating fixed effects regressions (FE). These investigate the effects of over-time changes in the independent variables on changes in the dependent variable. As an example, the effect of improvements of mental and physical health on changes of dropout intentions can be estimated. Therefore, FE models enable to analyze intra-individual changes over the course of the studies (Brüderl, 2010). Another strength of the methodological design is the elimination of unobserved between-person heterogeneity, since the influence of time-constant variables is excluded by solely considering intraindividual changes (Allison, 2009; Wooldridge, 2010). Within this methodological framework, interaction effects of HRQoL measures and success probability on students' dropout intentions were examined. Interaction effects describe that the effect of one independent variable, here success probability, is moderated by the value of another variable, here HRQoL (Jaccard & Turrisi, 2003). To structure the regression results, a stepwise approach was taken: First, in order to test the first three research questions (RQ 1a, RQ 1b & RQ 2), the impacts of the independent variables were examined (blockwise). Second, the interaction effects between HRQoL measures and success probability were calculated (RQ 3a & RQ 3b). Finally, the effects of the main independent variables are tested by simultaneously controlling for influences of some well-known control variables in higher education research. Hierarchical models have the advantage of uncovering possible mediations and suppressions between the independent variables (Kopp & Lois, 2012). Interaction effects are additionally illustrated by a jitterplot. To implement this, a median split of the measures for PCS and MCS was performed in order to reduce graphical complexity.

Robustness Checks

In a recent article, Baalmann et al. (2022) showed that the LAST dataset is confronted with some trends of selective panel mortality, a methodological problem that is well-known for panel studies in general. There are noticeable declines in the share of male and foreign respondents between waves 1 and 4. Higher attrition rates diminish the statistical power of the longitudinal analyses and exacerbate issues of sample selectivity (Olson & Witt, 2011). In response to that, several further analyses were performed to check the robustness of the findings. These particularly include the repeated execution of the analyses using multiple imputation. This measure also addresses the issue that listwise deletion implies a consider-

able reduction of sample size. Following the guidelines by Rubin (1987) and van Buuren (2018), five imputed datasets were created, each with ten iterations. Replacement was based on several predictor variables that had a Pearson correlation of at least 0.1 with the target variable or the response/nonresponse information and at least 25% usable cases. As a further robustness check, calculations with a subsample of respondents who participated at all four waves were performed.

Measures

Dropout Intentions

Dropout intentions reflect tendencies of students to leave university without achieving their degrees. In this study, dropout intentions consist of three items ($\alpha=0,79$), constructed as a mean score following Trautwein et al. (2007). One of the items is: 'I am seriously thinking of giving up studying' (from 1=does not apply at all, to 5=does completely apply).

Health (HRQoL)

The subjective state of health is measured by a German version of the Short Form Survey (SF-12). This is a short version of the longer original instrument (SF-36) developed by Ware et al. (1993), which is one of the most commonly used measures of HRQoL. In the following analyses, seven subdimensions are used. These include physical role functioning, bodily pain and general health as measures for the students' physical health as well as vitality, social functioning, emotional functioning and mental health as indicators for psychological health. Construction methodology of the physical and mental composite score (PCS & MCS) closely corresponds to the original scale instructions of Ware et al. (1995). Accordingly, only complete cases answering all SF-12 items are included in the analysis. The subscales (either as single item or mean score) were transformed linearly to a scale of 0-100, with higher values representing better HRQoL. In a second step, PCS and MCS are calculated by performing a mean score of the subscales. Validity of SF-12 has been confirmed in various international tests (Drixler et al., 2020; Gill et al., 2007).

Evaluation of the Studies

Subjective Costs: The subjective costs of studying are measured by students' obligations to give up competing objectives (such as maintaining existing social contacts, early economic independence) so that they can be in the respective degree program. The single-item measure is a common measure for subjective costs of studying in German higher education research which has also been applied in other student surveys such as the German National Educational Panel Study (NEPS) or the Berliner-Studienberechtigten-Panel (Best Up). Answers range from 1 (does not apply at all) to 4 (does completely apply).

　Subjective Benefits: The yields of graduating were assessed by agreement to the statement that the respective degree 'is an important step to achieving [one's] goals in life'. This item represents the self-assessed instrumentality of the studies in the sense of the so-called instrumental intermediate goals by Lindenberg (1990). The item has also already

been applied in the NEPS in the exact same wording, ranging from 1 (does not apply at all) to 4 (does completely apply).

Success probability: The conviction that the desired degree can be achieved is measured by assessment of the following statement: ‚I am convinced that I will successfully complete my studies’. As in the case of the before-mentioned items, answer options range from 1 to 4 with higher values representing higher self-assessments of success probability.

Control Variables

Social integration: Social integration into the student body was measured by three items based on the Social Integration Scale by Schiefele et al. (2002). This scale asks for frequency and quality of the interactions with fellow students. An example item is: ‘I have many contacts with students in my cohort.’ Answers range from 1 (does not apply at all) to 4 (does completely apply).

Intrinsic Motivation: Respondents were also asked about their learning motivation using a German adaptation of the Academic Self-Regulation Questionnaire (SRQ-A) from Ryan and Connell (1989) that explicitly addresses university student populations. The scale consists of three items including ‘I learn because I enjoy it.’ Answers range from 1 to 5 with higher scores indicating higher intrinsic motivation.

Taking up a job (Employment status): Respondents were asked whether they had a side job alongside studying. A dummy variable was created with employed students building the first category and non-employed students as reference category. Since FE models examine the effect of changes in the independent variable, the impact of transitions from non-employed to employed is examined here.

Results

The results of the FE regressions are outlined in Table 2. In the first model (M1), the impact of the central independent variables is tested (RQ 1a & RQ 1b). It becomes apparent that only mental HRQoL displays significant correlations with changes in students’ dropout intentions. An improving MCS is linked to a decrease in respondents’ dropout intentions, whereas changes in PCS do not show significant influences. At first sight, the size of the effect of the MCS seems to be rather small due to the low coefficient of $r = -0.01^{***}$. However, actually the opposite is true due to the large range of the scale of the health component scores. The mentioned coefficient describes that an increase of the MCS by one scale point (from 100) is connected with a decrease by 0.01 scale points (from 4) in dropout intentions. Thus, even very small improvements in mental HRQoL are accompanied with measurable reductions of thoughts of leaving university.

In M2, the students’ evaluations of their studies (costs, benefits, success probability) display the expected influences on dropout intentions. While enhances in the yields and the self-assessed likelihood of successfully graduating come along with lowered dropout intentions, heightened subjective costs of studying have the opposite effect. Especially success probability appears to be a strong predictor as its increase by one scale unit is associated with a decrease of dropout intentions by 0.28 scale points, which is very significant on a four-point scale (RQ 2).

Table 2 Fixed effects regressions on students' dropout intentions (waves 1–4)

DV: Dropout intentions					
	M1	M2	M3	M4	M5
HRQoL:					
PCS	-0.001		-0.001	0.002	0.001
	(0.00)		(0.00)	(0.00)	(0.00)
MCS	-0.01***		-0.005***	-0.02***	-0.02***
	(0.00)		(0.00)	(0.00)	(0.00)
Evaluation of the studies:					
Subjective costs		0.05***	0.03**	0.03**	0.03**
		(0.01)	(0.01)	(0.01)	(0.01)
Subjective benefits		-0.09***	-0.10***	-0.09***	-0.09***
		(0.02)	(0.02)	(0.02)	(0.01)
Success probability		-0.28***	-0.26***	-0.49***	-0.48***
		(0.02)	(0.02)	(0.07)	(0.05)
PCS*success probability				-0.001	-0.001
				(0.00)	(0.00)
MCS*success probability				0.01***	0.01***
				(0.00)	(0.00)
Control variables:					
Social integration					-0.06**
					(0.02)
Intrinsic motivation					-0.10***
					(0.02)
Employment status: Taking up employment					-0.02
					(0.02)
Wave (ref: wave 1):					
Wave 2	0.05***	0.07***	0.06***	0.06***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Wave 3	-0.01	0.02	0.02	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Wave 4	-0.03	0.04*	0.02	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Within R^2	0.055	0.151	0.173	0.190	0.207
Within adj. R^2	0.053	0.149	0.171	0.187	0.203
Num. obs.	4,221	4,221	4,221	4,221	4,221

***$p<0.001$; **$p<0.01$; *$p<0.05$

M3 analyzes the main effects of HRQoL and students' evaluations of their studies under mutual control of each other. All effects described still stay significant. Also, the explanatory power of the main independent variables is striking since 17% of explained variance is relatively high for FE models.

M4 contains the same variables as M3 but additionally tests for interaction effects of HRQoL and success probability on dropout intentions (RQ 3a & RQ 3b). The assumed interaction effect of mental HRQoL and success probability could be confirmed. For students with larger mental health improvements, increases in success probability negatively affect the dropout intentions stronger. Between physical HRQoL and success probability, no interaction effect on dropout intentions could be found. Graph 1 illustrates the interactions
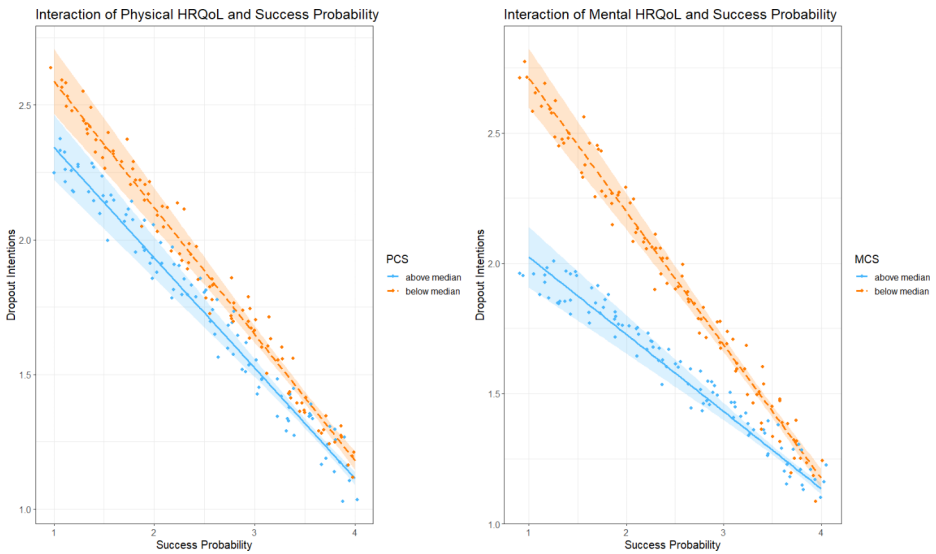
Graph 1 Jitterplot of the interaction effects of HRQoL and success probability on students' dropout intentions (pooled dataset, N=4,221)

in a jitterplot. It can be seen that for respondents with an above-median MCS the regression line is less steep. This means that students' dropout intentions, regardless of their health status, tend to be low when they rate their success probability as very high. However, the lower the self-assessed success probability, the more differences in dropout intentions occur between respondents with a MCS above the median and those below: For both groups, dropout intentions increase with lower success probability, but, as expected, the increase is somewhat greater for students with relatively poor mental HRQoL.

In M5, main effects and interaction effects are proven in their robustness by additionally implementing several control variables. The findings demonstrate that the interaction effect of MCS and success probability on students' dropout intention remains statistically significant. Meanwhile, the control variables mainly show the expected correlations: increases in social integration into the student body and increases in intrinsic learning motivation go along with declining dropout intentions. Taking up a side job does not affect dropout propensity. Time effects can be reported at the transition from the first to the second wave evidenced by a significant increase in dropout intentions. For waves 3 and 4, only minor changes can be reported. This applies for all specifications of the regression models (M1-M5). In the full model (M5), about 20% of the variance of respondents' dropout intentions could be explained. This means the control variables only add another 1.7% to the explained variance.

Robustness Checks

As a reaction on the panel mortality issues of the LAST data, two basic robustness checks with different sample cuts have been applied. First, missing values have been substituted with estimated values by using multiple imputation methods. The results of the FE regressions with these data are presented in Table B in the Appendix. Essentially, the reported

results could be confirmed. Both the main effect of mental HRQoL (RQ 1b) and the interaction effect with success probability (RQ 3b) again are statistically significant. Coefficients and p-values of the remaining predictors are also very similar to those in Table 2 underpinning the previous results. The only relevant difference to the prior models is that physical HRQoL is now significantly related to dropout intentions in M3 (RQ 1a). However, this relationship is not significant when only considering health information in M1. It is conceivable that some kind of suppression effect is effective here. Moreover, the proportion of explained variance is slightly lower under use of multiple imputation methods, but the difference is rather small.

Second, additional calculations have been applied with a subsample of those students who took part in all four survey waves. Again, these examinations confirm all of the reported effects. Deviations in coefficients and p-values are mostly slight. While the main effect of mental HRQoL on dropout intentions appears to be stronger for this subsample (RQ 1b), the interaction effect is somewhat smaller but still remains highly significant (RQ 3b). Interestingly, the negative effect of social integration on dropout intentions could not be confirmed for this subsample. A possible explanation could be that the variance of this variable is rather low in this sample since persons who participated in all survey waves could be a highly socially connected subgroup that hardly experiences increases in social integration. Considering the fact that both further analyses basically confirm the presented mechanisms, findings can be viewed as robust.

Discussion

The presumed relationship could be validated by the empirical results: HRQoL is indeed related to students' dropout intentions. More concretely, it is primarily the students' mental HRQoL that exerts an influence – physical health problems, which are reported considerably less frequently among respondents anyway, have no significant effect on the propensity to drop out. Moreover, analyses revealed that the association of mental HRQoL and dropout intention is also driven by an interaction effect of MCS and the self-assessed likelihood of a successful completion of the studies: For students with lower MCS, the increase of dropout intentions with decreasing success probability is comparatively stronger than for those with better MCS. Therefore, this study extends the empirical research in higher education by identifying mental health as an important further predictor for university students' dropout intentions and also by improving the understanding about the impact of another predictor (success probability). For exploring university dropouts, it is apparently not sufficient to only focus on the students' cognitive and motivational dispositions and the conditions of their studies. Rather, this article follows up on some previous research contributions (Hovdhaugen & Aamodt, 2009; Neyt et al., 2019; Pokorny et al., 2017) that adjacent life domains and general life circumstances must also be included for important educational decisions.

Another result of this examination is that value-expectation theory makes a relevant contribution to predict university students' dropout tendencies. This is underlined by the 15% of explained variance of the dependent variable that is attained by solely including subjective costs, subjective benefits and success probability as independent variables. Particularly, success probability appears to be a decisive determinant. Given the high average rating among the analyzed sample (m=3.32 on a four-point scale) as well as the comparatively small vari-

ance (sd=0.61), even slight doubts of one's own capabilities can certainly trigger serious thoughts about a possible early departure from higher education. However, a considerable proportion of the variance of the dependent variable could not be explained by the applied models. It can be concluded that the research for predictors of dropout intentions is still far from being complete and theoretical models, that can reliably predict dropouts, have to be much more elaborated. In German higher education research, for example Heublein (2014) and Feldhaus and Speck (2020) made such attempts, which should be given more weight for future international research.

The complexity of the relationship between health and education has already been noted at the very beginning since several articles have highlighted the correlation of higher education levels with better health status. For university students, however, this connection should be less influential since they represent a population group of relative educational homogeneity. Nevertheless, it must be stated that factors directly related to the studies could also influence students' health conditions, suggesting conceivable effects of reversed causality. Higher education holds various strains such as the academic workload, competitive pressure among fellow students, the necessity of career choices, or struggles with the financial situation. Stress theoretical approaches emphasize that distress can exert harmful influences on individuals' mental health and also physical health, especially if it continuously spans over longer periods of time (Lazarus & Folkman, 1984; Lovallo, 2005). And indeed, previous studies that investigated the impact of study-related stressors on students' health habits and health status concluded that corresponding correlations do prevail (Bovier et al., 2004; Pascoe et al., 2020; Shankar & Park, 2016). Accordingly, dropout intentions and uncertainties about one's future professional life could also pose a stressor with conceivably negative effects on students' health.

These considerations make it promising for future research to examine potential reciprocal effects between students' health and dropout intentions. As an example, Random Intercept Cross-Lagged-Panel Models could shed light on the complex and dynamic relationship between the two factors (Mulder & Hamaker, 2021; Mund & Nestler, 2019). Focusing on students' health as the dependent variable is also relevant for another reason: In addition to completing their studies and managing the associated stresses and strains, most students also have to cope with central developmental tasks of the life stage of emerging adulthood. The multitude of challenges encompasses, for example, the search for identity, changes in life situation, gains in autonomy, instability and uncertainties (Arnett, 2000). All of these transition challenges can be stressful and interfere with students' health (Zaleski et al., 1998).

This paper concentrated on interaction effects between HRQoL and success probability (p). However, from a perspective of value-expectation theory, further interaction effects of health with the benefits linked with the studies (U) on students' dropout intentions could also be conceivable, mainly in cases of severe illnesses or chronic diseases. Especially if health problems first occurred during the ongoing studies, the ailment and the high efforts for combat and treatment could push the importance of instrumental goals of other spheres of life (so as the studies) into the background. Instead of persistently pursuing the goal of graduating, the students' focus would most likely shift to their general life satisfaction, well-being and health outlook. This could trigger serious dropout tendencies. However, there are several further adaptations to such situations that could weaken the potential relationship: Students may also temporarily break their studies until substantial improvement comes to pass. Another possible response might be to consider a change of subject/university which

could make it easier to manage both the serious illness and the studies (e.g. by joining a university closer to the residence). Nevertheless, further research on the effects of severe health impairments on the course of the studies could be insightful, even if this concerns only a small proportion of students. Meanwhile, the costs of studying (c) are not expected to be closer related to the students' HRQoL. It does not seem very plausible that one's state of health could change one's subjective assessment of the costs associated with one's studies (in terms of giving up other things that are personally important, as measured in the present data).

Limitations

Meanwhile, this study exhibits some limitations. One major issue is that this study does not capture actual dropouts from higher education, but rather focuses on the subjective indicator of students' dropout intentions. Empirical evidence of connections between HRQoL, success probability and finite departures should thus be a target of future higher education research. Related to this issue, correlations between HRQoL and dropout intentions could at least partly be explained by the fact that both are *self-reported* measures. Respondents may have been led to negatively biased evaluations of one domain if the other one is linked with dissatisfaction and negative experiences. However, the subjective measurement of the dependent variable can also be viewed as a methodological strength since dropout intentions reveal dissatisfaction with the studies *before* the students come to their final decision. Past studies, although quite a few years old, demonstrated that a considerable proportion of students with dropout intentions (shares range from one fifth to one third) actually leaves university at a later stage (Gold, 1988; Meyer et al., 1999).

A second central limitation is the question of the direction of the relationship. This question has also been raised by Klein et al. (2021). As stated above, it is also conceivable that instead of health affecting students' dropout intentions, doubts about one's studies could negatively affect one's mental health implying reversed causality. Actually, the two explanations are not even really mutually exclusive. Influences could also be bidirectional which is why research with adapted methodology should be applied. Complex interdependencies of the individual's various life contexts have also been stated by life course theory (Bernardi et al., 2019; Huinink & Kohli, 2014).

Another restriction of the study concerns the construction of the HRQoL measures. According to the scale instructions of Ware et al. (1995), both PCS and MCS should be weighted by the factor score coefficients of all eight subscales. Since the LAST project did not survey the subscale of physical functioning and scale instructions require positive and negative weights for *both* component scores, weights were not applied in the analyses. Future studies should therefore replicate this study's findings with weighted HRQoL measures, including the subscale of physical functioning, to achieve higher levels of comparability.

At last, it is worth mentioning that there may be some kind of omitted variable bias since even in the full model (M5) there are nearly 80% of the variance being unexplained. However, fitting a regression model always implies finding a balance between accounting for all relevant effects on the one hand and limiting the number of independent variables on the other hand.

Practical Implications

Two main practical implications can be derived by the empirical results: at first, it appears to be very important for universities to place particular focus on the students' mental health state. While physical HRQoL among the sample can be described as at least average, psychological problems were reported strikingly frequent indicating an increased susceptibility of students for psychological issues. These results are in line with previous research on the prevalence of mental health issues among German and international university students (Auerbach et al., 2018; Grützmacher et al., 2018). However, studies have shown that a large share of students does not seek help for their mental health issues due to unawareness, fear of stigmatization or skepticism about institutional health care services (Eisenberg et al., 2007; Storrie et al., 2010; Wyatt & Oswalt, 2013). Also, students' demands for health promotion at universities and actual supply still diverge (Nöhammer, 2022). Therefore, counseling centers may be placed directly on campus to remove barriers in (mental) health care access. Short distances may make it easier for students to seek psychological support. In order to lower the inhibition threshold, universities could also engage in agenda-setting and openly address psychological stresses of students to the public. By raising awareness of these issues, universities may do its part to reduces social stigmas.

Second, it became clear that health problems of students not only pose a threat for their individual well-being, but can also affect their educational success. Poor mental health is linked with an increase of serious thoughts about leaving university prematurely. Also, an interaction effect of mental health and success probability on students' dropout intentions has been identified. Knowledge about these connections suggests a closer interlinking of general student advisory centers and the above-mentioned psychological counseling centers in questions of educational trajectories. Student counseling could broaden its focus and not only take the individuals study conditions into account, but also the students' general life circumstances including their health situation. Moreover, personal convictions of one's own academic abilities should be fostered in these settings since low expectancy has shown to be a strong predictor of dropout intentions. Due to the identified repercussions on dropout propensity, the promotion of students' health should become the universities' very own interest requiring both general preventive and case-specific interventive elements. This applies to universities in Germany as well as all over the world.

Appendix

Table A Standardized means of HRQoL measures (N=4,221; reference group: representative sample of the German general population; database: SOEP 2004, provided by Andersen et al., 2007).

	Range	Mean	SD
Physical HRQoL:			
Physical role functioning	21.92–59.72	50.43	9.23
Bodily pain	23.00–59.85	51.23	8.98
General physical health	24.85–66.37	50.31	10.11
Mental HRQoL:			
Vitality	26.82–70.60	46.73	9.35
Social functioning	15.73–57.12	46.65	11.26

Table A Standardized means of HRQoL measures (N=4,221; reference group: representative sample of the German general population; database: SOEP 2004, provided by Andersen et al., 2007).

	Range	Mean	SD
Emotional role functioning	13.34–58.08	43.98	11.66
General mental health	19.73–68.58	43.97	9.57

Values were standardized around Mean = 50 and SD = 10 with values higher than 50 indicating a relative better health in comparison to the reference population, while for values below 50 the opposite is true.

Table B Fixed effects regressions on students' dropout intentions with multiple imputation of missing values (waves 1–4)

DV: Dropout intentions					
	M1	M2	M3	M4	M5
HRQoL:					
PCS	-0.001		-0.001[*]	0.002	0.002
	(0.00)		(0.00)	(0.00)	(0.00)
MCS	-0.01[***]		-0.004[***]	-0.02[***]	-0.02[***]
	(0.00)		(0.00)	(0.00)	(0.00)
Evaluation of the studies:					
Subjective costs		0.05[***]	0.04[**]	0.04[***]	0.03[***]
		(0.01)	(0.01)	(0.01)	(0.01)
Subjective benefits		-0.08[***]	-0.08[***]	-0.08[***]	-0.07[***]
		(0.02)	(0.01)	(0.01)	(0.01)
Success probability		-0.27[***]	-0.26[***]	-0.46[***]	-0.48[***]
		(0.01)	(0.01)	(0.05)	(0.05)
PCS*success probability				-0.001	-0.001
				(0.00)	(0.00)
MCS*success probability				0.05[***]	0.01[***]
				(0.00)	(0.00)
Control variables:					
Social integration					-0.04[*]
					(0.02)
Intrinsic motivation					-0.10[***]
					(0.02)
Employment status: Taking up employment					-0.03
					(0.02)
Wave (ref: wave 1):					
Wave 2	0.05[***]	0.08[***]	0.07[***]	0.06[***]	0.05[***]
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Wave 3	-0.02	0.01	0.01	0.01	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Wave 4	-0.02	0.04[*]	0.03	0.02	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Within R^2	0.051	0.147	0.168	0.183	0.199
Num. obs.	7,169	7,169	7,169	7,169	7,169

[***]$p<0.001$; [**]$p<0.01$; [*]$p<0.05$

Table C Fixed effects regressions on students' dropout intentions using a subsample of respondents who took part in all four survey waves

DV: Dropout intentions					
	M1	M2	M3	M4	M5
HRQoL:					
PCS	-0.001		-0.000	0.001	0.001
	(0.00)		(0.00)	(0.00)	(0.00)
MCS	-0.06***		-0.004***	-0.03***	-0.02***
	(0.00)		(0.00)	(0.00)	(0.00)
Evaluation of the studies:					
Subjective costs		0.06**	0.05**	0.05**	0.06**
		(0.02)	(0.02)	(0.02)	(0.02)
Subjective benefits		-0.11***	-0.11***	-0.10***	-0.10***
		(0.03)	(0.03)	(0.03)	(0.03)
Success probability		-0.32***	-0.30***	-0.67***	-0.65***
		(0.03)	(0.03)	(0.09)	(0.09)
PCS*success probability				0.000	0.000
				(0.00)	(0.00)
MCS*success probability				0.01***	0.01***
				(0.00)	(0.00)
Control variables:					
Social integration					-0.05
					(0.03)
Intrinsic motivation					-0.15***
					(0.03)
Employment status: Taking up employment					0.03
					(0.04)
Wave (ref: wave 1):					
Wave 2	0.03	0.08*	0.07*	0.06	0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Wave 3	-0.04	0.01	0.01	0.00	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Wave 4	-0.04	0.05	0.04	0.02	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Within R^2	0.039	0.191	0.205	0.235	0.262
Num. obs.	1,080	1,080	1,080	1,080	1,080

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$

Authors' Contributions Not Applicable.

Declarations

Conflicts of Interest The author has no financial or proprietary interests in any material discussed in this article.

Ethics approval There was no need to go through an ethics committee, as all participant information was completely anonymized and participation in the study was completely voluntary. Therefore, no conclusions about specific individuals can be drawn. The correct conduct of the study was confirmed by the data protection officer of the University of Oldenburg.

Consent to participate All respondents voluntarily participated in the LAST study.

Consent for publication The author declares that the manuscript is original and has not been published elsewhere in any other form or language. Also, it is not under consideration for publication anywhere else.

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