Submitted: 21 February, 2023 Accepted: 11 May, 2023 Published: 30 August, 2023 DOI:10.22514/jomh.2023.072

ORIGINAL RESEARCH

JOMH Journal of Men's Health

Thoughts about dropping out of studies as warning sign for suicidal ideation and mental health problems in male university students

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Abstract

Despite increasing rates for suicidal ideation in university students, male students remain reluctant in reporting such thoughts. It is thus paramount to establish more easily detectable risk factors for male students. The present study examines study dropout thoughts as potential low-treshold risk factor as well as gender-differences in established risk patterns. A total of $N = 4894$ German university students (24.6% men) completed a cross-sectional online survey on their mental health at the University of Cologne. In addition to sociodemographic and questions related to university studies (*e.g.*, dropping out of studies), the Patient Health Questionnaire D (PHQ-D) was used to assess psychological syndromes (any psychological syndrome, depressive syndrome, alcohol syndrome), life stressors and suicidal ideation. Study dropout thoughts were more prevalent among male students, while being associated with increased suicidal ideation for both genders assessed. For all outcomes, significant gender-differences were observed with financial stress and a recent bad experience being risk factors for suicidal ideation in men but not women. Relationship problems, problems at work and current psychotherapy use were positively associated with suicidal ideation in women but not in men. Thus, study dropout thoughts were associated with suicidal ideation in university students and there were male-specific risk patterns for suicidal ideation and associated mental health problems. Consequently, male university students reporting study dropout thoughts or financial stress should be screened for suicidality and mental health problems. Future prevention measures in the University context should consider study dropout thoughts and male-specific risk-patterns to increase the chances to detect male student's suicidality and to improve the effectiveness of suicide prevention programs for men.

Keywords

Suicidal ideation; Students; Study dropout thoughts; Gender differences

1. Introduction

Suicide is a major public health concern worldwide [1]. While suicide rates have declined globally [2], suicide remains the second leading cause of death in university students [3] and the prevalence of suicidal ideation is increasing in this group [4]. Male university students and men in general have a higher risk to die by suicide [5–7] but are also less likely to disclose suicidal thoughts or behaviors [7–12]. This pattern may be founded in traditional masculinity ideologies (TMI), which are socially defined sets of standards and norms related to the male gender role (*e.g.*, dominance or self-reliance). Central dimensions of TMI, such as "emotional control" and "self-reliance" stand in the way of seeking help [9, 10, 12]. Pressure to prove one's strength may also lead men to resort more drastic means in the event of suicide, which may partially explain the gender gap in the rate of death by suicide, that contrasts with the more frequent suicide attempts by women. Because men are less likely to discolse suicidal ideation but at a greater risk to die by suicide, it is essential to establish low-treshold warning signs to identify at risk male students and to provide them with assistance in times of crisis.

There exists already a great body of research on risk factors of suicide and suicidality [13], such as psychiatric conditions (*e.g.*, major depressive disorder, bipolar disorder, alcohol use disorder, schizophrenia or posttraumatic stress disorder) are among the most important risk factors for suicide [14]. Suicide risk is further increased by life stressors, *e.g.*, financial and relational problems [8, 14]. Consistently, it was shown that university students with fewer financial means exhibit a higher risk for suicidal ideation [4]. Financial problems may also lead to feelings of burdensomeness which are strongly related to suicide risk [15]. In addition, previous research finds consistent associations between suicidal ideation and

measures of relational problems, such as loneliness, thwarted belongingness, and social isolation [16]. However, due to the fact that men are even hesitant to report such risk factors to family members or friends because of TMI such as the need to be tough, self-reliant, dominant or stoic, the identification of these risk factors mainly depends upon individuals reaching out to professionals. As a result, men's reluctance to seek help for mental health problems renders screening for the above mentioned risk factors less functional [17]. Therefore, other more low-threshold risk factors that men are more likely to report than more sensitive risk factors are urgently needed for the early detection and effective prevention of male student's suicide.

In the early detection of suicidal ideation and mental health problems in male university students, study dropout thought may play a key role because they are more openly communicated than mental health problems and suicidal ideation. Research on TMI consistently highlights that seeking help for mental health problems is diametrically opposed to TMI of self-reliance and emotional control, that still affect how men and also in particular young men think and feel today [8, 17–21]. In contrast, when communicating study dropout thoughts, male students may feel they seem in control of the situation being able to end the potentially overwhelming situation whenever they want, while secretly facing fear of failure.

Importantly, despite the increasing prevalence of suicidal ideation among university students, lower suicide rates as compared to age-matched peers indicate that academic achievement may be a protective factor [22]. Consistently, lower academic achievement is associated with suicidal ideation, mental health problems and substance use [23]. In turn, thoughts about giving up this protective factor may be an important warning sign for mental health problems and suicidal ideation.

For men in particular, dropout thoughts might represent more than just the potential loss of a resource. TMI include dimensions of being successful and assertive, which conflict with university dropout [24]. Other studies report a greater impact of unemployment, job loss, or income loss on suicidality for men compared to women, which may be related to the fact that the main nonpecuniary cost of these aspects is loss of social status [25, 26]. TMI characterized by dominance, pursuit of status, and primacy of work contrast with the loss of social status that results from unemployment, involuntary job loss, or also dropping out of university. While research on gender differences in university student suicidality is lacking [3], findings on the relationship between job related problems, financial problems, status loss and male suicide underscore the serious consequences that career interruptions can have primarily for men [8, 27, 28].

The aim of the present study is to investigate the role of study dropout thoughts in male university student's suicidality and mental health and to explore potential gender-differences in patterns of risk factors. Using multiple regression analysis, study dropout thoughts and life stressors such as relational and financial problems will be investigated with regard to their relation to suicidality, depression, alcohol use and overall mental health.

2. Materials and methods

The study analyzed data from a cross-sectional online survey, conducted at the University of Cologne, Germany, in the winter semester 2014/2015 (cologne study of students on psychological stress). *Via* their university e-mail address, 44,299 students were invited to participate and 4894 completed the survey. Inclusion criteria thus consisted of being enrolled in the University of Cologne at the time of the survey. However, due to a technical problem, student of the Faculty of Mathematics and Natural Sciences could not be reached.

2.1 Procedure

The survey was accessed by clicking on a link in the invitation e-mail. If the informed consent and the data privacy agreement were accepted, participants could proceed to the survey questions. These consisted of a first part consisting of questions about sociodemographic information and university studies and a subsequent mental health assessment with a validated German version of the patient health questionnaire (PHQ-D; [29]). Participation took around 20–30 min and was not compensated. Students were provided contact information for possible questions regarding the survey and at the end of the survey an overview of contacts of counseling centers and clinics was displayed.

2.2 Material

Participants were asked to indicate sociodemographic information such as age, gender and nationality (For a detailed overview see (**Supplementary Table 1**). Gender identity was assessed using two response options ("male" or "female"). Participants were further asked about current psychotherapy use ("yes" or "no"), the intention to attend psychotherapy ("yes" or "no"), and information regarding their university studies (*e.g.*, subject, semester, study financing, study dropout thoughts, dropout of previous studies). The item on psychotherapy use was found to possess convergent (positive correlation with depressive symptoms $r = 0.18$, $p < 0.001$ and anxiety symptoms $r = 0.17$, $p < 0.001$) and divergent (negative correlation with self-esteem $r = -0.19$, $p < 0.001$) validity as well as high reliability (Cohen's kappa over a one-month period of $\kappa = 0.92$) in a previous study using the same university population [17].

The PHQ-D [29] is the German version of the Prime MD Patient Health Questionnaire (PRIME MD PHQ; [30]) and was used to assess mental health related variables and outcomes. The 78-items self-report questionnaire is designed to facilitate recognition and diagnosis of the most common mental disorders in primary care. Depending on the question, different modular combinations of the subscales (somatoform disorders, depressive disorders, anxiety disorders, eating disorders and alcohol abuse) are possible. Among the items assessing depressive syndrome, one item specifically screens for the frequency of suicidal ideation ("Thoughts that you would rather be dead or cause yourself suffering") in the course of the past two weeks (1 = "never" to 4 = "nearly every day"). In addition to the American original which is based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-

IV), the German version also allows an assessment according to International Classification of Diseases (ICD) criteria. The questionnaire consists mainly of closed answers, but also includes a few open questions, with the closed questions being a mix of yes-no questions (*e.g.*, "In the past year, have you been hit, kicked, or otherwise physically hurt by someone, or has someone forced you to perform an unwanted sexual act?"), symptom check lists, and three to four step Likert scales. For example, participants are asked to indicate how much they felt affected by different life stressors (relational, financial, not having anyone to talk to, and something bad that happened recently) over the past four weeks on a three step scale (1 = "not affected" to 3 = "strongly affected"). For the original American version correlations with patient's functional level and with external criteria have been demonstrated. Translation was done according to state of the art criteria in several steps of translation and back-translation [29]. Preliminary evidence indicates convergent validity of the German version of the PHQ-D with the Structured Clinical Interview for DSM-IV (SKID-I) [31].

2.3 Statistical analysis

The statistical analysis consisted of multiple binomial logistic regression analyses (MLE) computed in the R software environment (version 4.1.2, R Foundation for Statistical Computing, Vienna, Austria). Each regression model consisted of the following predictor variables: study dropout (actual dropout and dropout thoughts), sociodemographic information (gender and age), stress related variables (relationship, caretaking, work, financial, lack of support and traumatic experience related stress), sexual/violent abuse, and current psychotherapy use. All predictor variables were regressed on each of the following binary outcome variables: suicidal ideation, any psychiatric syndrome, depressive syndrome and alcohol syndrome. Each model was estimated for the entire sample as well as for men and women separately, leading to a total of 12 ($1 \times 4 \times 3$) regression models. For all analyses, an initial alpha-level of 0.05 was used to test for statistical significance, subsequently using a Holm-Bonferroni correction for multiple testing to correct the familywise error rate.

3. Results

The present study analyzed data from 4894 German university students (24.6% male), to investigate study dropout thoughts and gender-differences in potential risk factors for suicidal ideation, any psychiatric syndrome, depressive syndrome, and alcohol use syndrome. As shown in Table 1, students were on average 24.3 (SD = 4.9) years old and the majority was of German nationality (94.7%). While about every fourth student dropped out of a previous study program (24.2%), almost every other student reported thinking about dropping out of their current study program (45.6%). Out of all students, 70.5% received financial aid from relatives, 67.8% financed their studies with a part-time job, 24.2% reported governmental financial aid, and 4.4% received a scholarship. The majority of students reported to experience stress because of their working (69.9%) and financial (52.3%) situation. While only 8.7% of students were currently using psychotherapy, about one-third (28.4%) reported an intention to start psychotherapeutic treatment and 16.7% reported to experience suicidal ideation. The percentage of students reporting any psychiatric syndrome was as high as 58.4%, with depressive (34.9%), somatoform (23.6%), alcohol use (19.1%), and anxiety (12.5%) being the most prevalent syndromes.

Regarding statistically significant gender differences (**Supplementary Table 1**) male students were on average older than female students and had disproportionately often dropped out of a previous study program. In line with this, significantly more male students reported thinking about dropping out of their current study program than female students (48.3% *vs.* 44.8%). Female students, on the other hand, more often experienced stress due to caretaking responsibilities, their working and financial situation, and because of a past trauma. Female students also reported more frequent psychotherapy use (past, current, and intention to start). Regarding psychiatric syndromes, female students more often reached the cutoff for anxiety syndrome, generalized anxiety syndrome, and somatoform syndrome. Male students, on the other hand, more often reached the cutoff for a clinically relevant alcohol use syndrome.

As displayed in Table 1, study dropout thoughts were positively associated with suicidal ideation. Furthermore, stress related to relationships, work, finances, lack of support and traumatic experiences were also associated with increased suicidal ideation. Similarly, experienced sexual and/or physical abuse and current psychotherapy use were also associated with increased suicidal ideation. In the analysis by gender, relationship-related stress, work-related stress, current psychotherapy use, and sexual/physical abuse were only associated with suicidal ideation among female students. Financial stress and traumatic experiences, on the other hand, were only associated with suicidal ideation among male students. Importantly, gender and age were not associated with suicidal ideation in these models.

Regarding the risk to reach the cutoff for any psychiatric syndrome (Table 2), study dropout thoughts were again associated with an increased risk for a psychiatric syndrome in the total sample as well as in the male and female subsamples separately. However, there were gender-specific risk-patterns. Most importantly, previous study dropout, stress related to work and finances, and current psychotherapy use were only associated with an increased risk for a psychiatric syndrome in female students, but not in male students. Age was inversely associated with the risk for a psychiatric syndrome in female students only. Experienced sexual and/or physical abuse was, however, associated with an increased risk for a psychiatric syndrome in male students only.

Regarding the risk for a depressive syndrome (Table 3), study dropout thoughts were again associated with an increased risk for a depressive syndrome in the total samples as well as among men and women separately. The following gender-specific risk factors were identified: lower age, stress experienced because of relationships, and current psychotherapy use were associated with an increased risk for a depressive syndrome among female students only. Conversely, stress due

TABLE 1. Suicidal ideation as outcome variable.

	β (SE)	OR	p	p.corr
Total Sample				
(Intercept)	−3.47 (0.12)	0.03	<0.001***	<0.001***
Study dropout	0.05 (0.10)	1.05	0.623	0.838
Study dropout thoughts	0.76 (0.09)	2.13	<0.001***	<0.001***
Male gender	0.15 (0.10)	1.16	0.128	0.512
Age	−0.04 (0.04)	0.97	0.419	0.838
Stress relationship	0.27 (0.09)	1.30	0.002**	0.010*
Stress caretaking	0.12 (0.10)	1.12	0.246	0.738
Stress work	0.38 (0.11)	1.47	<0.001***	0.003**
Stress financial	0.30 (0.09)	1.35	0.001**	0.009**
Stress no support	1.29 (0.09)	3.63	<0.001***	<0.001***
Stress traumatic experience	0.33 (0.10)	1.39	<0.001***	0.005**
Abuse (sexual/violent)	0.71 (0.18)	2.04	<0.001***	<0.001***
Current psychotherapy use	0.91 (0.12)	2.48	<0.001***	<0.001***
χ^2 (12) = 698.73; $p < 0.001$***; pseudo-R^2 = 22.4%; AIC = 3748.1; BIC = 3832.5; Acc. = 77.3%				
Men				
(Intercept)	−3.51 (0.24)	0.03	<0.001***	<0.001***
Study dropout	−0.15 (0.19)	0.86	0.435	1.000
Study dropout thoughts	0.72 (0.18)	2.06	<0.001***	<0.001***
Age	0.02 (0.08)	1.02	0.799	1.000
Stress relationship	0.07 (0.17)	1.08	0.672	1.000
Stress caretaking	−0.07 (0.21)	0.93	0.717	1.000
Stress work	0.40 (0.21)	1.49	0.056	0.336
Stress financial	0.76 (0.19)	2.14	<0.001***	<0.001***
Stress no support	1.32 (0.18)	3.75	<0.001***	<0.001***
Stress traumatic experience	0.77 (0.20)	2.15	<0.001***	0.001**
Abuse (sexual/violent)	0.76 (0.34)	2.13	0.027*	0.187
Current psychotherapy use	0.41 (0.28)	1.50	0.147	0.734
χ^2 (11) = 215.97; $p < 0.001$***; pseudo-R^2 = 26.8%; AIC = 948.2; BIC = 1009.4; Acc. = 78.6%				
Women				
(Intercept)	−3.42 (0.14)	0.03	<0.001***	<0.001***
Study dropout	0.12 (0.11)	1.12	0.301	0.566
Study dropout thoughts	0.78 (0.10)	2.17	<0.001***	<0.001***
Age	−0.06 (0.05)	0.94	0.210	0.566
Stress relationship	0.32 (0.10)	1.38	0.001**	0.009**
Stress caretaking	0.17 (0.11)	1.19	0.134	0.534
Stress work	0.37 (0.12)	1.45	0.003**	0.017*
Stress financial	0.14 (0.11)	1.15	0.189	0.566
Stress no support	1.28 (0.10)	3.61	<0.001***	<0.001***
Stress traumatic experience	0.20 (0.11)	1.22	0.073	0.365
Abuse (sexual/violent)	0.71 (0.21)	2.04	<0.001***	0.008**
Current psychotherapy use	0.49 (0.14)	1.62	<0.001***	0.004**
χ^2 (11) = 502.72; $p < 0.001$***; pseudo-R^2 = 21.6%; AIC = 2799.9; BIC = 2874.5; Acc. = 76.6%				

*Note: SE: standard error; OR: odds ratio; p: p-value; p.corr: p-value corrected for multiple testing using the holm method; AIC: Akaike information criterion; BIC: Bayesian information criterion; Acc.: Accuracy; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.*

TABLE 2. Any psychiatric syndrome as outcome variable.

	β (SE)	OR	p	p.corr
Total Sample				
(Intercept)	−1.04 (0.07)	0.35	<0.001***	<0.001***
Study dropout	0.19 (0.08)	1.21	0.012*	0.049*
Study dropout thoughts	0.73 (0.06)	2.07	<0.001***	<0.001***
Male gender	−0.06 (0.07)	0.94	0.376	0.376
Age	−0.13 (0.03)	0.87	<0.001***	<0.001***
Stress relationship	0.44 (0.07)	1.55	<0.001***	<0.001***
Stress caretaking	0.13 (0.08)	1.14	0.135	0.269
Stress work	0.45 (0.07)	1.57	<0.001***	<0.001***
Stress financial	0.45 (0.07)	1.57	<0.001***	<0.001***
Stress no support	0.71 (0.07)	2.03	<0.001***	<0.001***
Stress traumatic experience	0.28 (0.09)	1.32	0.001**	0.007**
Abuse (sexual/violent)	0.49 (0.20)	1.64	0.013*	0.049*
Current psychotherapy use	0.49 (0.12)	1.63	<0.001***	<0.001***
χ^2 (12) = 698.73; $p < 0.001$***; pseudo-R^2 = 22.4%; AIC = 3748.1; BIC = 3832.5; Acc. = 77.3%				
Men				
(Intercept)	−0.94 (0.13)	0.39	<0.001***	<0.001***
Study dropout	−0.01 (0.14)	0.99	0.953	1.000
Study dropout thoughts	0.70 (0.13)	2.01	<0.001***	<0.001***
Age	−0.14 (0.07)	0.87	0.034*	0.168
Stress relationship	0.40 (0.14)	1.50	0.003**	0.022*
Stress caretaking	0.02 (0.18)	1.02	0.931	1.000
Stress work	0.36 (0.14)	1.43	0.009**	0.064
Stress financial	0.33 (0.14)	1.39	0.016*	0.095
Stress no support	0.56 (0.14)	1.75	<0.001***	0.001**
Stress traumatic experience	0.92 (0.21)	2.51	<0.001***	<0.001***
Abuse (sexual/violent)	0.18 (0.32)	1.20	0.569	1.000
Current psychotherapy use	0.53 (0.28)	1.71	0.058	0.231
χ^2 (11) = 215.97; $p < 0.001$***; pseudo-R^2 = 26.8%; AIC = 948.2; BIC = 1009.4; Acc. = 78.6%				
Women				
(Intercept)	−1.10 (0.08)	0.33	<0.001***	<0.001***
Study dropout	0.26 (0.09)	1.30	0.003**	0.014*
Study dropout thoughts	0.74 (0.07)	2.11	<0.001***	<0.001***
Age	−0.13 (0.04)	0.88	<0.001***	0.003**
Stress relationship	0.45 (0.08)	1.56	<0.001***	<0.001***
Stress caretaking	0.17 (0.10)	1.18	0.087	0.174
Stress work	0.49 (0.08)	1.63	<0.001***	<0.001***
Stress financial	0.48 (0.08)	1.62	<0.001***	<0.001***
Stress no support	0.77 (0.09)	2.15	<0.001***	<0.001***
Stress traumatic experience	0.14 (0.10)	1.15	0.151	0.174
Abuse (sexual/violent)	0.67 (0.26)	1.96	0.011*	0.033*
Current psychotherapy use	0.47 (0.14)	1.60	<0.001***	0.003**
χ^2 (11) = 502.72; $p < 0.001$***; pseudo-R^2 = 21.6%; AIC = 2799.9; BIC = 2874.5; Acc. = 76.6%				

*Note: SE: standard error; OR: odds ratio; p: p-value; p.corr: p-value corrected for multiple testing using the holm method; AIC: Akaike information criterion; BIC: Bayesian information criterion; Acc.: Accuracy; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.*

TABLE 3. Depressive syndrome as outcome variable.

	β (SE)	OR	p	p.corr
Total Sample				
(Intercept)	−2.40 (0.09)	0.09	<0.001***	<0.001***
Study dropout	0.10 (0.08)	1.11	0.180	0.540
Study dropout thoughts	0.98 (0.07)	2.66	<0.001***	<0.001***
Male gender	−0.15 (0.08)	0.86	0.063	0.251
Age	−0.12 (0.04)	0.89	<0.001***	0.004**
Stress relationship	0.43 (0.07)	1.53	<0.001***	<0.001***
Stress caretaking	−0.00 (0.08)	1.00	0.987	0.987
Stress work	0.56 (0.08)	1.75	<0.001***	<0.001***
Stress financial	0.45 (0.07)	1.56	<0.001***	<0.001***
Stress no support	1.00 (0.07)	2.71	<0.001***	<0.001***
Stress traumatic experience	0.29 (0.08)	1.34	<0.001***	0.003**
Abuse (sexual/violent)	0.17 (0.18)	1.19	0.334	0.668
Current psychotherapy use	0.42 (0.11)	1.53	<0.001***	0.001**
χ^2 (12) = 698.73; $p < 0.001$***; pseudo-R^2 = 22.4%; AIC = 3748.1; BIC = 3832.5; Acc. = 77.3%				
Men				
(Intercept)	−2.54 (0.17)	0.08	<0.001***	<0.001***
Study dropout	0.04 (0.16)	1.04	0.804	1.000
Study dropout thoughts	0.88 (0.14)	2.42	<0.001***	<0.001***
Age	−0.16 (0.07)	0.85	0.034*	0.170
Stress relationship	0.35 (0.14)	1.42	0.015*	0.091
Stress caretaking	−0.09 (0.18)	0.92	0.623	1.000
Stress work	0.56 (0.16)	1.75	<0.001***	0.004**
Stress financial	0.55 (0.15)	1.74	<0.001***	0.002**
Stress no support	0.95 (0.14)	2.59	<0.001***	<0.001***
Stress traumatic experience	0.60 (0.19)	1.82	0.001**	0.010*
Abuse (sexual/violent)	0.06 (0.32)	1.06	0.863	1.000
Current psychotherapy use	0.51 (0.26)	1.66	0.049*	0.200
χ^2 (11) = 215.97; $p < 0.001$***; pseudo-R^2 = 26.8%; AIC = 948.2; BIC = 1009.4; Acc. = 78.6%				
Women				
(Intercept)	−2.40 (0.10)	0.09	<0.001***	<0.001***
Study dropout	0.13 (0.09)	1.14	0.157	0.472
Study dropout thoughts	1.01 (0.08)	2.74	<0.001***	<0.001***
Age	−0.11 (0.04)	0.90	0.008**	0.041*
Stress relationship	0.45 (0.08)	1.56	<0.001***	<0.001***
Stress caretaking	0.02 (0.10)	1.02	0.839	0.839
Stress work	0.56 (0.09)	1.76	<0.001***	<0.001***
Stress financial	0.41 (0.08)	1.51	<0.001***	<0.001***
Stress no support	1.01 (0.08)	2.74	<0.001***	<0.001***
Stress traumatic experience	0.21 (0.09)	1.24	0.022*	0.089
Abuse (sexual/violent)	0.22 (0.21)	1.24	0.310	0.619
Current psychotherapy use	0.40 (0.13)	1.49	0.002**	0.009**
χ^2 (11) = 502.72; $p < 0.001$***; pseudo-R^2 = 21.6%; AIC = 2799.9; BIC = 2874.5; Acc. = 76.6%				

*Note: SE: standard error; OR: odds ratio; p: p-value; p.corr: p-value corrected for multiple testing using the holm method; AIC: Akaike information criterion; BIC: Bayesian information criterion; Acc.: Accuracy; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.*

to a traumatic experience was associated with an increased risk for a depressive syndrome among male students only.

Finally, male gender, younger age, experienced stress related to relationships and finances, and abuse were identified as risk factors for an alcohol use syndrome (Table 4). Moreover, study dropout thoughts and traumatic experiences were found to a risk factor for men only, whereas work-related stress was a risk factor for women only. Importantly, these gender-specific risk factors did not withstand a correction for multiple testing. Additional analyses including all psychiatric symptoms as predictor variables are provided in the (**Supplementary Table 2**).

4. Discussion

The present study adds to the literature by identifying study dropout thoughts as a potential low-threshold risk factor for suicidal ideation and exploring gender-differences in established risk factors.

In the present study, study dropout thoughts were a significant risk factor for suicidal ideation in both men and women, while significantly more men reported dropout thoughts. Gender differences in risk patterns were observed for all outcomes, with financial stress and a recent bad experience being risk factors for suicidal ideation in men but not women. Relationship problems, problems at work, and current psychotherapy use were positively associated with suicidal ideation in women but not in men.

Especially for men, study dropout thoughts may be a valuable warning sign in the early detection of suicidal ideation and mental health problems because they are more easily detectable in simple university contexts as well as in clinical practice than more sensitive risk factors (*e.g.*, suicidal ideation), that men are often reluctant to speak about.

The importance of establishing low-treshold risk factors for the early detection of male suicidal ideation lies in men's higher risk of dying by suicide while being less likely to seek help for mental health problems [9, 17]. Due to some aspects of TMI such as toughness, emotional control, dominance and self-reliance, the anticipated vulnerability associated with opening up about one's suffering leaves men reluctant to seek help.

Importantly, suffering itself may already be perceived as incongruent with TMI and cause additional psychological strain. In line with this, previous research finds that gender-differences in the prevalence and presentation of mental disorders are related to traditional beliefs about masculinity [18, 32]. It is thus assumed that alcohol use and male typical externalizing depression symptoms (*e.g.*, aggression or riskful behavior) serve to avoid negative emotions. Similarly, study dropout thoughts may occur to avoid failure and suggesting being in control when a situation actually seems unmanageable, with failure being a threat to TMI of success, power, dominance, whereas being in control of a situation is a central aspect of TMI.

At the same time, the severe consequences of career interruptions for the male psyche are well documented [7, 8, 27]. While in the short run, university dropout may serve to suggest that one is taking on an active role instead of being subject to failure, it may nevertheless result in feelings of incongruence with masculinity ideals (*e.g.*, success or pursuit of status) in the long run. Although, dropout thoughts are more likely to be communicated than psychological problems because of the suggested control over the situation, their risk should not be underestimated.

Finally, some limitations of our study deserve consideration. First, the cross-sectional nature of our study does not allow inference of causality or time dependency. Future studies may consider a longitudinal design to test for causality and assess the timely sequence of risk factors and suicidal ideation. Because we examined gender as a stratifying rather than a direct interaction effect, results related to differences between men and women must be interpreted on a descriptive basis, rather than as statistically significant effects. Moreover, as the majority of ideators do not attempt suicide the question arises as to why it should be useful to find a proxy for suicidal ideation. The answer is twofold: on the one hand, if many ideators did not attempt suicide in the time frames investigated by past research, this does not imply that ideators are as far from doing so as non-ideators or that there is no need to detect and offer them help. On the other hand, if many of these who attempt suicide do not report suicidal ideation, this only underscores the need to find low-treshold risk factors for suicidal ideation who are more likely to be reported than suicidal ideation itself. Moreover, the PHQ-D that was used for the mental health assessment is based on prototypical depression symptoms, whereas TMI is associated with more externalizing, male-specific symptoms that are often overlooked when screening for typical depression symptoms [33–36]. Thus, future studies on gender-differences in suicide risk factors may benefit from using male specific instruments in addition to established mental health instruments. Furthermore, the generalizability of our findings to students from different faculties is limited by the fact that students from the Faculty of Mathematics and Natural Sciences could not be included due to a technical error. Another limitation is that the study only assessed two gender categories. This may have masked different patterns of risk factors among gender diverse individuals. Considering the disproportionally high prevalence of suicidality in this population as compared to cis-gender peers, there is a strong need of evidence-based interventions for gender non-conforming individuals [37]. Finally, the scope of the study was limited to personal variables. Future research may consider the contribution of institutional and structural factors on male university student's mental health. In turn, a better understanding of extra-personal factors may contribute to more effective individual-level interventions and *vice versa*.

5. Conclusions

The present study identifies study dropout thoughts as an early warning sign for suicidal ideation and mental-health related problems among university students. Considering the impact of TMI on men's symptom expression and their reluctance to seek help, especially for male students' study dropout thoughts appear to be a useful early warning sign to identify suicidal ideation. Furthermore, the study addresses the lack of research on gender-differences in university student's risk factors for suicidal ideation and related variables. Future research may

TABLE 4. Alcohol syndrome as outcome variable.

	β (SE)	OR	p	p.corr
Total Sample				
(Intercept)	−2.28 (0.10)	0.10	<0.001***	<0.001***
Study dropout	0.09 (0.09)	1.09	0.317	1.000
Study dropout thoughts	0.07 (0.08)	1.07	0.389	1.000
Male gender	0.81 (0.08)	2.24	<0.001***	<0.001***
Age	−0.24 (0.04)	0.79	<0.001***	<0.001***
Stress relationship	0.23 (0.08)	1.26	0.003**	0.022*
Stress caretaking	−0.04 (0.10)	0.96	0.690	1.000
Stress work	0.21 (0.09)	1.24	0.016*	0.111
Stress financial	0.44 (0.08)	1.55	<0.001***	<0.001***
Stress no support	0.06 (0.08)	1.06	0.509	1.000
Stress traumatic experience	0.08 (0.10)	1.08	0.393	1.000
Abuse (sexual/violent)	0.67 (0.17)	1.95	<0.001***	<0.001***
Current psychotherapy use	−0.09 (0.14)	0.92	0.515	1.000
χ^2 (12) = 698.73; p < 0.001***; pseudo-R^2 = 22.4%; AIC = 3748.1; BIC = 3832.5; Acc. = 77.3%				
Men				
(Intercept)	−1.55 (0.14)	0.21	<0.001***	<0.001***
Study dropout	−0.07 (0.15)	0.93	0.632	1.000
Study dropout thoughts	0.30 (0.14)	1.35	0.028*	0.225
Age	−0.24 (0.08)	0.78	0.002**	0.025*
Stress relationship	0.28 (0.14)	1.32	0.042*	0.297
Stress caretaking	−0.13 (0.18)	0.88	0.463	1.000
Stress work	0.18 (0.15)	1.20	0.232	1.000
Stress financial	0.29 (0.15)	1.34	0.047*	0.297
Stress no support	0.04 (0.15)	1.04	0.767	1.000
Stress traumatic experience	0.46 (0.18)	1.59	0.012*	0.104
Abuse (sexual/violent)	0.76 (0.29)	2.14	0.009**	0.089
Current psychotherapy use	−0.17 (0.27)	0.84	0.515	1.000
χ^2 (11) = 215.97; p < 0.001***; pseudo-R^2 = 26.8%; AIC = 948.2; BIC = 1009.4; Acc. = 78.6%				
Women				
(Intercept)	−2.25 (0.11)	0.10	<0.001***	<0.001***
Study dropout	0.16 (0.11)	1.18	0.132	0.792
Study dropout thoughts	−0.04 (0.09)	0.96	0.680	1.000
Age	−0.23 (0.06)	0.79	<0.001***	<0.001***
Stress relationship	0.21 (0.10)	1.23	0.028*	0.222
Stress caretaking	0.00 (0.11)	1.00	0.962	1.000
Stress work	0.22 (0.11)	1.25	0.046*	0.322
Stress financial	0.50 (0.10)	1.64	<0.001***	<0.001***
Stress no support	0.06 (0.10)	1.06	0.534	1.000
Stress traumatic experience	−0.06 (0.11)	0.94	0.611	1.000
Abuse (sexual/violent)	0.63 (0.21)	1.88	0.003**	0.026*
Current psychotherapy use	−0.07 (0.16)	0.93	0.650	1.000
χ^2 (11) = 502.72; p < 0.001***; pseudo-R^2 = 21.6%; AIC = 2799.9; BIC = 2874.5; Acc. = 76.6%				

*Note: SE: standard error; OR: odds ratio; p: p-value; p.corr: p-value corrected for multiple testing using the holm method; AIC: Akaike information criterion; BIC: Bayesian information criterion; Acc.: Accuracy; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.*

extend our findings by considering the relationship of the identified gender-differences to traditional beliefs about gender, the contribution of structural factors, and investigating these factors among more diverse gender identities.

AVAILABILITY OF DATA AND MATERIALS

Data will be made available upon request.

AUTHOR CONTRIBUTIONS

RW—designed the research study; performed the research. LE, FL and AW—analyzed the data. FL, RW, LE, AW—wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The survey was approved by the Ethics Committee of the Medical Faculty of the University of Cologne. The Approval Number is 14-059. Informed consent was obtained from all participants in the study.

ACKNOWLEDGMENT

We would like to thank all study participants for completing the survey.

FUNDING

The study received no specific funding. Andreas Walther and Lukas Eggenberger were supported by a grant from the Swiss National Science Foundation awarded to Andreas Walther (PZPGP1_201757).

CONFLICT OF INTEREST

The authors declare no conflict of interest. Andreas Walther is serving as one of the Guest Editor of this journal. We declare that Andreas Walther had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to HSK.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.jomh.org/files/article/1696781303592960000/attachment/Supplementary%20material.docx.

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How to cite this article: Flora Logoz, Rainer Weber, Lukas Eggenberger, Andreas Walther. Thoughts about dropping out of studies as warning sign for suicidal ideation and mental health problems in male university students. Journal of Men's Health. 2023; 19(8): 60-69. doi: 10.22514/jomh.2023.072.