Sickness Absence and the Role of Personality, Human Values and Attitudes
Experimental and Longitudinal Studies

Gøril Kvamme Løset
Norwegian Social Research (NOVA)
OsloMet – Oslo Metropolitan University

Submitted for the degree of PhD at the
Department of Psychology,
Faculty of Social Sciences,
University of Oslo, Fall semester 2021
# Table of Contents

List of Abbreviations .................................................................................................................. I

Acknowledgements .................................................................................................................... III

Summary ..................................................................................................................................... V

List of Papers ............................................................................................................................. IX

Introduction .................................................................................................................................. 1

The Norwegian Sick Pay Scheme ............................................................................................... 3

Disease, Illness and Sickness Absence ....................................................................................... 5

Approaches and Models for Understanding Sickness Absence ................................................ 7

Sick Leave Factors and Empirical Findings with a Focus on Personality and Human Values .. 12

Personality Traits ........................................................................................................................ 13

Human Values ............................................................................................................................. 15

Attitudes and Sickness Absence ............................................................................................... 17

The Complex Relationship between Gender and Sickness Absence ....................................... 18

Research Objectives .................................................................................................................. 22

Paper I ......................................................................................................................................... 22

Paper II ....................................................................................................................................... 22

Paper III ..................................................................................................................................... 23

Data and Methods ..................................................................................................................... 23

Procedure and Participants ....................................................................................................... 24

The Norwegian Life-Course, Aging and Generation Study (Papers I and II) ......................... 24

Paper I ....................................................................................................................................... 26

Paper II ..................................................................................................................................... 27

Vignette Study (Paper III) ........................................................................................................ 29

Ethics ......................................................................................................................................... 33

Measures ................................................................................................................................... 34
Errataliste ........................................................................................................................................... 87
Papers I–III .......................................................................................................................................... 91
List of Abbreviations

BFI – the Big Five Inventory
CES-D – the Center for Epidemiologic Studies Depression Scale
CI – confidence interval
HVS – the Human Values Scale
IRR – incident rate ratios
ISCO – the International Standard Classification of Occupations
M – mean
NAV – the Norwegian Labour and Welfare Administration
NOK – Norwegian Krone (currency of Norway)
NorLAG – the Norwegian Life-Course, Ageing and Generation Study
N (n) – sample size
NOVA – Norwegian Social Research
OR – odds ratio
OECD – the Organisation for Economic Co-operation and Development
PVQ – the Portrait Values Questionnaire
SAVAN – Explaining social patterns in sickness absence: the influence of values, attitudes and norms (research project)
SD – standard deviation
SES – socio-economic status
USD – United States Dollar
Acknowledgements

This dissertation is part of the research project *Explaining social patterns in sickness absence: the influence of values, attitudes and norms* (SAVAN) funded by a grant from the Research Programme on Sickness Absence, Work and Health by the Research Council of Norway (grant no. 237993). Other than myself, the SAVAN group included Tale Hellevik, Arne Mastekaasa, Harald Dale-Olsen and Kjersti Misje Østbakken. Thank you for nice discussions at project meetings, feedback on article drafts and for your careful efforts in designing the excellent data set that one of the articles in the thesis is based on. Special thanks to project leader, Tale, for cheering me on and being a sparring partner across the whole project period, and thanks to all study respondents.

The thesis would also not have come to fruition if it was not for my supervisors: Tilmann von Soest and Arne Mastekaasa. As my main supervisor, Tilmann has promptly answered e-mails and been available for meetings when needed, even sometimes on holiday, and has provided indispensable support, criticism and guidance throughout the whole process. He has also been a steady source of professional and methodological support since I first met him in the role of supervisor on my master’s thesis in 2012. Arne, as co-supervisor with decades of research experience on various aspects of sick leave, has asked timely questions and given essential professional and methodic feedback.

I have been employed at the Department of Ageing Research and Housing Studies at NOVA, OsloMet – Oslo Metropolitan University, throughout the work with the thesis. Being part of this research environment has been very beneficial for my progress and I would like to thank the whole team of colleagues, with research director Hans Christian Sandlie at the helm, for seeing me through. I especially thank Marijke Veenstra for first taking me in at NOVA and for showing me the ropes in the research world for almost a decade now. Also, a special thanks to the “youthful” panel of colleagues and ex-colleagues, Maja, Hanna, Thomas, Silje and Jardar for the company, countless lunches and great amounts of banter to re-energise during or after the working day. You have been tremendously understanding and fun. Great thanks, to the participants in the Health psychology seminar group over three semesters at the Department of Psychology, University of Oslo, for their input too.

I would also like to thank my friends and family, particularly Carlo and our two sons, Alve and Hjalmar, who were both born during the thesis period. Despite the complications of a
global pandemic, you have given me the right amount of distraction and support needed to push through to the finishing line of the dissertation work and I am truly grateful.

A final gratitude goes to the Norwegian welfare scheme for making it possible to start a family while pursuing a doctor’s degree and for providing financial security and access to health care when sickness struck.

Gøril Kvamme Løset,
Oslo, December 2021
Summary

The economic toll of sickness absence is substantial for most welfare states. Although sick leave is intended to help the employee with health problems that affect the ability to work, long periods of sick leave can also entail sanctions in working life for the individual and increase the risk of needing other health-related social benefits, and ultimately result in marginalisation from working life. Sickness absence in Norway is extensive compared with other OECD countries and is characterised by sociodemographic variations. Finding factors and mechanisms that lead to sickness absence is thus highlighted in the political debate. To address this issue, the present study investigated whether less well-researched psychological factors are associated with attitudes towards sickness absence and constitute possible sources of variations in sickness absence beyond mental and somatic health.

This thesis consists of three scientific papers that aimed to provide novel information about three important questions in the domain of sickness absence and dispositional explanatory factors: whether personality dimensions predict sickness absence; whether human values are associated with attitudes towards sickness absence and actual sickness absence; and whether gender differences in attitudes towards sickness absence exist. To study these questions, this thesis used longitudinal and experimental data from two comprehensive Norwegian studies.

Papers I and II used cross-sectional and longitudinal interview and survey data from the Norwegian Life-Course, Ageing and Generation Study (NorLAG) that was combined with longitudinal register data on sickness absence. Paper I was based on cross-sectional data from the second round of NorLAG that were collected in 2007 (60% response rate). The study sample comprised 5,017 employees between the ages of 18–62 years who had completed the interview and survey questionnaire. Respondent data were linked to annual register-based data on physician-certified sickness absence in the survey year and four years after (2007–2011). To study the prospective association between personality dimensions and sickness absence, negative binomial regression models were run in unadjusted and fully adjusted models with control for health and socio-demographic factors. The paper furthermore investigated whether age, gender, health and work factors moderated the relationship between personality dimensions and sickness absence.

In Paper II, longitudinal respondent data from the second (2007; 61% response rate) and third (2017; 68% response rate) rounds of NorLAG were used, which from now on are called
baseline and follow-up, respectively, in reference to this paper. These longitudinal data comprised a population-based sample of Norwegian adults born between 1922–1966. The study sample consisted of 1,330 employees, aged 40–57 years at baseline, who had completed interviews and survey questionnaires in both rounds of data collection. Respondent data were linked to annual register-based data on physician-certified sickness absence throughout the study period. The paper examined whether human values were prospectively related to attitudes towards sickness absence and to actual sickness absence. Stepwise linear regression models served to analyse the association between human values at baseline and sick leave attitudes at follow-up controlled for common risk factors for sick leave. Similarly, stepwise binary logistic regression analyses were used to assess the relationship between human values at baseline with self-reported sick leave at follow-up, and with register-based sick leave between baseline and follow-up.

Paper III was based on data from a factorial vignette survey with an experimental design that was conducted in 2016. The study sample consisted of 1,800 Norwegian employees aged 18–83 (50% women; 53% response rate) that was drawn from a general-purpose, web-based survey panel. The data were collected through an online questionnaire where the respondents were asked to judge six hypothetical sick-leave scenarios each (in total 10,800 vignettes). The main purpose of the paper was to investigate whether gender differences in attitudes towards sickness absence and sickness absence norms exist and consequently may be part of the explanation for the difference in sickness absence levels between men and women. Binary logistic regression analyses were used across three possible cut-points of sick leave judgements that were regressed on respondent gender and vignette gender. The paper also explored whether judgements differed by age and whether sickness absence judgments were different for typical female-dominated occupations compared to male-dominated and gender-balanced occupations.

The results in Paper I, showed that extraversion was related to an increased risk of sickness absence in fully adjusted analyses even when previous spells of sick leave were taken into account. Neuroticism was also positively associated with sickness absence, but not when controlling for previous sick leave. Interaction analyses suggested that age and type of occupation moderated some of the associations between personality dimensions and sickness absence. In Paper II, findings indicated that two of the values, achievement and self-direction, were associated with higher risk of self-reported sick leave, and that stimulation was related to lenient
attitudes towards sick leave in the adjusted analysis. Conservation values were associated with stricter sick leave attitudes when controlling for other covariates. None of the ten human values were related to the risk of receiving sickness benefits due to physician-certified sick leave. Although, women, compared to men, were slightly less likely to reject completely the legitimacy of sick leave in one of the analyses in Paper III, the findings overall showed that there was no substantial gender difference in either attitudes or norms of sickness absence. In terms of occupations, however, the results showed that respondents were more accepting of sickness absence in gender-dominated occupations (both male and female-dominated) compared with gender-balanced occupations.

The findings in this thesis provide indications that personality and human values are to some extent predictive of sickness absence even when health and other risk factors for sickness absence are considered. Human values seem to provide guidance primarily in situations where the individual typically has a greater opportunity to assess whether sickness absence is necessary, such as attitudes towards sickness absence and self-certified sickness absence, while personality dimensions also seem to predict longer-term, physician-certified sickness absence, which usually constitutes absence due to more serious mental or somatic health conditions. For gender, we conclude that gender differences in attitudes to sickness absence or social norms of sickness absence are not likely to be potent explanations for the higher levels of sickness absence among women compared to men. Overall, this thesis provides new knowledge about psychological dispositions that can be important for understanding sickness absence and that can be built on in practice and future research. Another important outcome of this thesis is that it provides little support for the popular claim that attitudes to sickness absence are important contributors to the gender gap in sickness absence.

This dissertation is part of the SAVAN research project (Explaining social patterns in sickness absence: the influence of values, attitudes and norms) who received funding from the Research Council of Norway (Research Programme on Sickness Absence, Work and Health; grant no. 237993).
List of Papers

Paper I
https://doi.org/10.1177/08902070211065236

Paper II
Løset, G. K., Hellevik, T., & von Soest, T. Basic Human Values and Sick Leave: A Study Combining Two-Wave Survey Data with Longitudinal Register Data (under review in the Scandinavian Journal of Psychology when the thesis was submitted. The paper was accepted for publication in the Scandinavian Journal of Psychology the 12th of June 2022).

Paper III
https://doi.org/10.1371/journal.pone.0200788
Introduction

The public expenditure on sick leave is substantial in most welfare states and sick leave has been a long-standing topic of political interest and research attention. In European countries, public expenditure on sick leave per capita are similar to expenditure on unemployment benefits (Scheil-Adlung & Sandner, 2010). The sickness absence incidence in Norway, which is the national setting of this thesis, is considered high compared with other OECD countries (OECD, 2010, 2013). Statistics from 2017, further shows that the OECD average of public expenditure on work incapacity (sickness absence and disability cash benefits) amounted to 1.6% of the GDP, ranging from less than 1% in countries such as Canada and Japan to 3.8% in Norway that had the highest expenditure on such incapacity (OECD, 2021). In 2019, the public expenditure on sickness benefits in Norway was estimated at 37.2 billion NOK (Ministry of Labour and Social Affairs, 2018) and the average sickness absence rate for the same year was 5.8% (Statistics Norway, 2019).

Sick leave is increasingly being considered a public health problem (Shiels et al., 2016). Apart from being costly for employers and the welfare scheme, the social patterns in sickness absence and disability benefits cause concern for growing social inequalities in society, as, amongst others, those with lower wages and education are overrepresented in this statistic (Mykletun et al., 2010). The recent rise in sickness absence and disability benefits due to mental health problems is also worrying (Brage & Nossen, 2017; OECD, 2013). In Norway, the increased share of persons under the age of 30 on disability benefit in recent years (Normann, 2019) further raises concern that a larger proportion of younger generations are unable to establish themselves in the labour market. Identifying factors associated with the risk of (long-term) sick leave and maintenance of absence are thus important for developing measures that help prevent the transition from sickness absence to more permanent work disability (Dekkers-Sanchéz et al., 2008).

Sickness absence levels differ between sociodemographic groups. Notably socio-economic status, age and gender are repeatedly associated with the risk of sickness absence (Allebeck & Mastekaasa, 2004a; Barmby et al., 2002; Markussen et al., 2011). Although some of this variation can be attributed to factors such as work conditions, health and morbidity (Löve et al., 2013; Markussen et al., 2011), studies suggest that individual absence propensity is also related to other individual characteristics that may predispose the individual’s vulnerability to
sickness absence (Dekkers-Sanchéz et al., 2008; Henderson et al., 2009; Markussen et al., 2011). Sickness absence can also be considered a social behaviour that can affect others and be sensitive to attitudes and norms in the environment (Patton, 2011). In this respect, dispositional factors can be an important source for understanding individual variations in sickness absence in terms of how the individual relatively perceives, attributes and handles risk factors for sickness absence such as problematic work environments and their own health situation. Knowledge on such mechanisms may be an important contribution to the development of interventions with the aim of preventing sickness absence (Vlasveld et al., 2013). Personality, human values and attitudes have been previously highlighted as possible dispositional sources of variations in work absence that deserves more attention (Harrison & Martocchio, 1998), but there is still a lack of studies linking these factors to variations in sickness absence, especially longer-term sickness absence. With regard to patterns in sickness absence, the gender difference in sickness absence in particular has been given considerable attention both in the research literature and in the media (Hellevik et al., 2019). Women are overrepresented in sickness absence in many European countries, including Norway (Barmby et al., 2002; Mastekaasa & Melsom, 2014), in Canada (Barmby et al., 2002; Dionne & Dostie, 2007) and in the United States (Patton & Johns, 2007). Despite large research interest, this gender difference is not well understood (Mastekaasa, 2016). Lack of knowledge about the mechanisms behind this gender difference can be unfavourable for women in the labour marked and provides fertile ground for speculation about what may be the cause. That men and women have different views on what constitute acceptable use of sick leave has been launched as a possible explanation, but few studies have examined this explanation (Hellevik et al., 2019).

On this backdrop, the present thesis aims to give new insight into psychological dispositions related to several aspects of sickness absence. First, a population-based study that comprises cross-sectional and longitudinal self-reported data combined with longitudinal data from national administrative registers is used to examine the role of personality dimensions and human values in predicting attitudes towards sickness absence and / or actual sickness absence beyond physical and somatic health and other risk factors for sickness absence. The understanding of these psychological factors as predictors of sickness absence is not well developed in the literature, even though such information may be used to identify individuals at risk for longer-term sickness absence and provide practice-relevant knowledge for workplace
adaption and return-to-work programmes. Second, a factorial vignette survey with experimental design is used with the aim to examine whether gender differences in attitudes and norms of sickness absence exist as an indirect attempt to understand if such attitudinal factors may be associated with the difference in sickness absence levels between men and women.

The thesis is divided into six sections. The remainder of this introductory chapter presents a more detailed background for understanding sickness absence and the psychological angle to this topic by discussing the sick pay scheme, different models to understand sick leave, risk factors for sick leave and previous empirical contributions that are relevant to the papers in this thesis. The second chapter describes the overarching research objectives of the thesis and of each of the three papers. In the third chapter, details on the materials and methods used in the thesis papers, such as study procedures, instruments and analytical approaches are presented, in addition to ethical considerations made during this work. The fourth chapter presents the study results of the three papers, which are then discussed in the fifth chapter of this thesis also with regard to the implications of the findings for practice and future research. The sixth and final chapter summarises and provides concluding comments on the main findings of the thesis.

The Norwegian Sick Pay Scheme

The current sickness benefit system in Norway was established in 1978. From the start, the main features were full wage compensation from the first sick day with shared costs between the employer and the state. The first two weeks covered by the employer and then costs were transferred to the national insurance. The basic idea was to ensure universal rights to full pay during illness to all employees, regardless of the status of the profession (NOU, 2021). Pressures from employers and employees’ organisations have largely contributed to the distribution of costs and the financial incentives in the sick pay scheme remaining largely unchanged for the last four decades since its establishment, despite various retrenchment attempts (Hagelund, 2014; Thesen, 2021). However, the process of being on sick leave has undergone changes during this time, with more activity requirements and a stronger emphasis on structuring and dialogue in the individual follow-up for those who are on longer-term sick leave (Hagelund, 2014). Such increased accountability of the employee, employer, physician and National Insurance Services have gradually emerged with the Intentional Agreement on a More Inclusive Working Life (the IA-agreement) that was first signed in 2001. This agreement was developed as a strategy to reduce sickness absence in Norway due to concerns related to the level of sickness absence and
indications that longer-term sick leave and disability benefit levels were on the rise. The agreement was contracted between the government and the main employers and employees’ organisations with the aim of reducing the sickness absence rate by 20 per cent through various proposed strategic means and measures without changing the costs and self-risks of sick leave for either employees or employers. The agreement has failed to reach this goal (Hagelund, 2014), but the overall conclusion is that the original goal of reducing the sickness absence rate has been halfway achieved. Yet the level of sickness absence is considered to have remained fairly stable since 2012 (Report from the follow-up group for the IA-agreement, 2016). The agreement is now in its fifth renegotiated version with a focus on creating conditions for an inclusive working life with high employment and reducing working life withdrawal and sick leave by 10% compared to the yearly average in 2018. The agreement now also applies to the entire Norwegian working life and not just to firms that committed to the agreement as was the case in previous periods of the agreement (Regjeringen.no, 2018). There is thus still a pronounced focus on reducing the sickness absence rate in Norway.

The Norwegian sickness benefit scheme is often described as generous compared with other countries. Shorter absence spells can be self-certified for up to three days in most workplaces, whereas longer spells must be physician-certified, usually by the general practitioner. The employee can receive full sick pay, up to a wage ceiling, for a maximum of one year before being transferred to less-well compensated health-related social security benefits such as disability insurance, if returning to work is not an option (Godøy & Dale-Olsen, 2018). The scheme is essentially trust based and previous studies have found that physician-certified sick leave seems to largely be driven and decided by the patient (Carlsen et al., 2020; Nilsen et al., 2011). Findings from a study using register data from around 2,500,000 employees and 6,000 general practitioners further indicated that employees tend to choose physicians that have a lenient practice of sickness certification (Markussen & Røed, 2017). Other findings from large scale register data also show that the recovery rate abruptly augments in the final weeks before sickness benefits have been depleted (Markussen et al., 2011; Nordberg & Røed, 2009), although large parts of such increases in work resumption are also associated with higher rates of relapse and disability benefit (Nordberg & Røed, 2009). These circumstances of the scheme suggest that sickness absence may be motivated by factors other than health status alone, and the good wage
compensation in Norway may open up more opportunities for non-economic factors, such as psychological dispositions, to play a role in the course of sick leave.

**Diseases, Illness, Sickness and Sickness Absence**

Although physician-certified sickness absence is prescribed on the basis of a medical diagnosis, there has been a change in focus in recent years from the diagnosis to functional assessment and the functional ability of the individual to work despite illness (Hagelund, 2014). This has led to a more extensive use of partial sick leave, which now should be the first alternative for physician-certified sickness absence as long as the functional ability allows this (Nossen & Lysø, 2018). Partial sick leave also fits with the view that whether one is too ill to work or not is not always clear cut (Godøy & Dale-Olsen, 2018). This is further illustrated by the trilogy concepts *disease, illness* and *sickness* that are widely used to distinguish modes of unhealth, where the first is viewed as the medical, objective pathology, the second as the subjective, personal experience, and the third as the social role or external status that is negotiated with society (e.g., Boyd, 2000). Ultimately, a person decides for himself if he or she is ill, but whether the person has a disease and / or is sick, is also assessed by the physician and the relevant social institution. In practice, the boundaries between the concepts are blurred and can influence each other, and they constitute value judgements of the parties involved (Boyd, 2000; Hofmann, 2002).

In this thesis, sickness absence is defined as absence from contracted work due to either self- or physician-certified health problems that are considered to cause impaired work ability. It is assumed that there is an upper limit for illness or injury beyond which no employee would attend work (Barmby et al., 1994). However, for the further understanding of the arguments in this thesis, it may be helpful to visualise that the employee has an illness threshold. When below the illness threshold the employee attends work, and when above this threshold the employee stays at home and potentially seeks health care depending on the illness (Barmby et al., 1994; Mastekaasa & Melsom, 2014). Differences in illness threshold is conditioned by individual characteristics but may also hinge on other factors such as the physical and psychological demands of the work (Mastekaasa, 2015; Mastekaasa & Melsom, 2014). In the following, we use the broader term *absenteeism* (or simply *work absence*) to denote general failure to attend scheduled work, including pure shirking and absence that is not necessarily justified by health problems and thus may be less excusable than the concept of *sickness absence*, because these two
concepts are often conflated in the research literature, and we reserve *sickness absence* for cases where only self- or physician-certified absence is the basis.

Health problems are a prerequisite for sickness absence, and empirical findings show that both morbidity and mortality are linked to sickness absence, especially spells lasting longer than a week, which substantiates sickness absence as a measure of health (Kivimäki et al., 2003; Laaksonen et al., 2011; Marmot et al., 1995). Also, previous spells and length of sickness absence are shown to predict future sickness absence (Dekkers-Sanchéz et al., 2008; Roelen et al., 2011). However, sickness absence is not an uncomplicated measure of health and can also be an expression of varying degrees of dissatisfaction and lack of motivation (Melsom & Mastekaasa, 2018). Moreover, sickness absence can involve pure shirking from work and thus be unrelated to health. It is common to consider that shorter self-certified absence is to a lesser extent determined by health problems than longer absences, because such absence do not require medical certification and is therefore often reasoned in less serious transient health problems and may be more driven by motivational factors (Mastekaasa, 2015). Yet, this type of absence constitutes only a small share of sickness absence in Norway (0.5% of the total sickness absence in 2019; Statistics Norway, 2019). Findings from a previous study also indicate that misuse of self-certified sickness absence is not a widespread problem in Norway (Bergsvik et al., 2010). The focus in this thesis is thus to examine whether selected psychological dispositions are important for variations in primarily physician-certified sickness absence because we lack knowledge on this topic and because the potential major consequences for society and the individual are primarily associated with this type of absence.

Although sickness absence is intended to protect workers’ health and status, and rapid resumption of work also seems to represent a greater risk of later sickness absence in some studies (e.g., Nordberg & Røed, 2009), other studies point to the health-promoting effects of work and that especially the passive aspects of complete longer-term absence can prolong sickness absence. Employees with mental disorders and musculoskeletal diseases, which are prevalent diagnostic categories for sickness absence, seem to have particularly good health effects of work activity according to ability (OECD, 2008; Shaw et al., 2018). A recent study on back pain among employees, for example, shows that early return to work reduced pain and improved functioning (Shaw et al., 2018), and graded return to work seems to be a successful work rehabilitation strategy by reducing the time dependent on sickness benefit and risk of
permanent work disability (Bethge, 2016). Even though work can be a source of stress and physical strain, employment is generally considered beneficial to health, which may also be related to work, for instance, being a source of social support, relatedness to society, sense of personal achievement, self-determination, structure in everyday life and financial security (Blustein, 2008; Shaw et al., 2018; van der Noordt et al., 2014). Combined with public spending and the increased risk that particularly long-term sickness absence may transition to more permanent welfare benefits, the political goal of reducing sickness absence also seems to take such potential health gains from work into account.

**Approaches and Models for Understanding Sickness Absence**

This leads us over to approaches and models for studying sickness absence. Sickness absence has traditionally been studied in several fields and disciplines such as economy, medical science, sociology and psychology. However, these fields have largely operated in isolation of each other, and multidisciplinary collaboration is rare (Allebeck & Mastekaasa, 2004b). Moreover, sickness absence is a complex phenomenon with factors at different structural levels that influence sickness absence. These factors are often organised at the national level (e.g., design and application of the sickness absence scheme; level of unemployment; composition of the labour force; general attitudes), at the level of the workplace or community (e.g., culture/attitudes at the workplace or in the neighbourhood/local society; physical, chemical and psycho-social work environment; gender-segregation within the workplace; geographical area) and at the individual level (e.g., socio-economic status; age; gender; personality; lifestyle; coping strategies; social network/support; earlier sickness absence; occupation; attitudes towards work and absence; Alexanderson, 1998). Accompanying these levels of factors influencing sickness absence, several theoretical hypotheses and models are proposed to explain sickness absence in the different disciplines and at different structural levels. This thesis focuses mainly on individual-level factors for sickness absence, but such factors must also be understood in the broader context of aggregate level factors, and Paper III additionally addresses general attitudes to sickness absence at national and societal group levels.

In economics, much of the focus has been on the pro-cyclical pattern in sick leave (i.e., temporal fluctuation in sickness absence) and that labour market conditions, such as reduced job security and high rates of unemployment, have a disciplinary effect on the employee’s inclination for sickness absence (e.g., Allebeck & Mastekaasa, 2004b; Grasdal, 2016). Building on economic
theory of rational choice and utility maximising decisions, this effect is conditioned by the employee believing that increased absence leads to an increased risk of losing the job or making it more difficult to get another job. Here, in a simple sense, the individual’s welfare is seen as a function of work and leisure where the employee seeks to maximise own welfare by finding the most beneficial balance possible between work and leisure, and that leisure is more valued with decreased health (Allebeck & Mastekaasa, 2004b; Barmby et al., 1994). The level of compensation for sickness absence is also regarded as an employee incentive and “moral hazard” is used to describe the concept that employee absence depends on the favourability of the sickness insurance scheme and may thereby also be associated with presenteeism (i.e., attending work despite feeling ill). More comprehensive models further include other trade-offs of costs for the individual in the event of absence, such as possible long-term negative consequences for salary and career advancement (Allebeck & Mastekaasa, 2004b).

Another explanation that has received attention in economics is that sickness absence fluctuates with the composition of the labour force because of sorting mechanisms that occur in times of downturns and upturns in the economy. During upturns and labour shortages, individuals with poor health are more likely to be sorted into the labour force and thereby increase sickness absence in the population, while the opposite is argued to be the case during downturns and staff cuts (Alexanderson, 1998; Nordberg & Røed, 2009). Such sorting mechanisms operate at the aggregate level and do not concern individual exposure of risk factors for sickness absence. However, economic fluctuations at the aggregate national level could also more directly affect factors at lower structural levels, particularly employees’ health and work environment, since upturns also can lead to higher demands at work and a more stressful work environment (Allebeck & Mastekaasa, 2004b; Nordberg & Røed, 2009). Findings from Norwegian register data show, for example, that sickness absence spells during economic upturns are associated with lower work resumption rates and higher rates of relapse into sickness absence, which indicate that cyclical patterns in sickness absence are driven by both employees’ health and discipline effects (Nordberg & Røed, 2009).

Stress theories, that are developed predominantly in medicine, sociology and psychology, are also preoccupied with stress as a cause for ill health and thus a possible cause of sickness absence (Allebeck & Mastekaasa, 2004b). Stress may be considered as a process that represents a person’s perceptual, psychological, physical and behavioural reactions to workplace factors and
stressors (Darr & Johns, 2008). Specifically addressing employee health and the work situation, Karasek’s widely applied job demand-control model (Karasek, 1979), focuses on the joint effects of these two work factors. High job demands and low job control are postulated to be a cause of job strain (i.e., poor mental and somatic health), while high control is hypothesised to buffer the negative health effects of high job demands and may also stimulate employee motivation and learning. In later developments, social support and integration at work was added to the model, and low social support in combination with a high strain job was hypothesised to be the most health damaging work situation, whereas high social support was stated to moderate the negative health effects of high strain jobs (see van der Doef & Maes, 1999). Research on the model has mainly been cross-sectional and with inconsistent results, but the hypotheses that high job control and social support can buffer strain has received less consistent support than the general idea that high strain jobs and low social support can be particularly harmful to employee health. The model also has been criticised for only including factors at the organisational level and not taking individual employee characteristics into account. Personality characteristics, personal resources and coping behaviour may, for example, affect the extent to which job control and social support relieves work strain (Kain & Jex, 2010; van der Doef & Maes, 1999).

More recent expansions of Karasek’s model have addressed this concern such as the Job Demands-Resources model, which suggests that employee well-being across occupational setting is contingent upon the balance between two factors, job demands and job resources. The model highlights two processes that take place simultaneously: the health impairment process, which is the result of high job demands (e.g., work overload and emotional demands) that require sustained efforts and thereby exhaust the mental and physical resources of the employee; and the motivational process, which assumes that job resources (e.g., career opportunities, support from colleagues, work autonomy) foster motivation and commitment in the workplace. Job resources may also reduce the strain of job demands and their potential health costs (Demerouti et al., 2001). Empirical evidence generally support these two main processes, and interactive effects between resources and demands, but some studies suggest that reversed causal effects also may be at play (e.g., Bakker & Demerouti, 2007). The model has later been expanded to include personal resources in some studies. Findings suggest that job resources foster personal resources such as self-efficacy and optimism and that this association is reciprocal over time (Demerouti & Bakker, 2011), while neuroticism was found to have both positive direct and indirect effects.
(through job demands) on health impairment and extraversion had both positive direct and indirect effects (through job resources) on organisational commitment. Such findings emphasise the potential role of personal characteristics in understanding individual variation in perceived symptoms of stress and that such factors may interact with resources and demands in the work environment, but more research is needed in this area (Bakker et al., 2010).

Another aspect of stress is coping behaviour. The way an individual perceives and deals with stressful situations at work is likely to be associated with the decision to report ill or seek physician-certified sickness absence, also called employee coping behaviour. Scholars differ in terms of whether they consider coping as a behaviour determined by environmental demands and whether it is a relatively stable personal characteristic. However, they generally agree in distinguishing between two general coping strategies. Problem-solving coping refers to the active strategy of directly targeting and solving a problem, while reactive-passive focused coping is seen as a strategy that aims at reducing the negative emotions that accrue in stressful situations (see van Rhenen et al., 2008). Such strategies can also be seen in relation to sickness absence and whether that is a functional strategy for coping with work-related strain and creating an opportunity for recuperation. Van Rhenen et al. (2008) found that employees with active problem-solving coping had fewer and shorter sickness absence spells, while, in contrast, employees with an avoidant coping style had longer and more frequent sickness absence spells. It has also been argued that some individuals are predisposed to be absent from work, which could be related to dispositional influences, and the appraisal of stressors as threatening could be associated with motivational and cognitive aspects of personality (e.g., Darr & Johns, 2008).

Process models of sickness absence are another set of models that particularly focuses on employee attendance and absence, combining factors that may influence absence on the individual level (i.e., health situation; personal characteristics) with both factors at the level of the organisation (e.g., work group norms; leader style) and society (i.e., economic/market conditions; norms). The widely used process model by Steers and Rhodes (1978), for example, considers absence as the function of primarily two important variables: the ability and motivation to attend work. The key factors for ability to attend are illness and accidents, but family responsibilities and problems of transportation to work are also included as possible obstacles to attending work. Personal characteristics of the employee such as age, gender, education and family size are largely considered to determine health status and other factors for ability to attend work.
Motivation to attend is suggested to be determined by pressures to attend, including economic and market conditions and organisational commitment, and by factors of the employee (employee values and expectations) and job situation (e.g., job level, leader style, role stress) that affect motivation to attend via their influence on job satisfaction. The more recent model proposed by Henderson et al. (2011) conceptualises sickness absence, return to work or complete occupational incapacity (disability benefit) as a process in key stages and pathways where unique sets of risk factors and barriers operate between these stages and influence the progression towards increasing occupational incapacity. Individual perceptions, beliefs and decisions are considered crucial to stage progression and whether the individual moves from symptoms of ill health to presenteeism (i.e., attending work despite having health problems that affect work capacity) or to sickness absence, either short-term (self-certified), or medically and culturally endorsed longer-term sickness absence.

Attitudes have also been introduced as a possible explanation for temporal fluctuations in sickness absence and for differences in sickness absence levels between groups (Hellevik et al., 2019). General changes in attitudes among employees, employers and/or sick leave certifiers are highlighted as possible explanations for findings from studies which, for example, show that there has been an increase in the frequency and duration of sickness absence associated with major life events (e.g., marital breakdown; Markussen & Røgeberg, 2012) and the duration of sickness absence due to “objective” health disorders (i.e., bone fractures and sprains) in the period from the mid-1990s to 2005 in Norway. It is considered unlikely that these changes in sickness absence are caused by changes in the medical consequences of such major life events and injuries during this period (Dale-Olsen & Markussen, 2010; Markussen & Røgeberg, 2012). Findings from another study using Norwegian register data from a similar period (1993–2005), characterised by an increase in sickness absence rates, found a within-individual rise in the age-adjusted propensity for sickness absence. This finding does not support the hypothesis that the increase in sickness absence was due to marginal workers with poor health being sorted into the labour force (Bjørn et al., 2013), but is compatible with changes in attitudes as a possible explanatory factor for changes in sickness absence. In theoretical terms, it is also reasonable to expect that attitudes may be important for sickness absence, but relatively few studies have addressed the relationship between attitudes to sickness absence and actual absence directly.
As reviewed, processes and factors on structural, organisational and individual levels are considered to be involved in the complex course of sickness absence across professional disciplines, approaches and research models. Economic models largely focus on how structural conditions affect the individual’s incentives for absence or the individual’s health due to increased demands for efficiency. Stress models have mainly been concerned with factors at the organisational level and how the combination of job demands and job control or job resources may be harmful to employee health or may lead to positive employee outcomes such as job motivation and commitment. That individual level factors may interact with these job factors and relate to perceptions of stress and types of coping behaviour has received greater attention in this type of models in recent years. Process models seem to integrate factors for sickness absence to the largest degree at all three structural levels where health situation, individual motivations and perceptions are considered decisive for the threshold or decision that sickness absence is necessary. These different models of sickness absence suggest that psychological dispositions may be important factors in understanding sickness absence, but there is a lack of knowledge on how such factors are associated with sickness absence and the maintenance of such absence. The need to consider the psychological aspects of sickness absence to a greater extent has also been emphasised among researchers (Harrison & Martocchio, 1998; Patton, 2011), but few studies have addressed the role of psychological dispositions in sickness absence, especially their association with longer-term sickness absence (Harrison & Martocchio, 1998). More research is therefore needed to select appropriate interventions and prevent the potentially subsequent transition to work disability (Dekkers-Sanchéz et al., 2008). By examining the Big Five personality traits, universally shared human values and attitudes to sickness absence, this thesis covers important psychological dispositions in a broad manner and aims to contribute to a greater understanding of how factors at the psychological individual level can be related to sickness absence.

**Sick Leave Factors and Empirical Findings with a Focus on Personality and Human Values**

The theoretical perspectives that were reviewed in the previous section predict that a number of factors are associated with sickness absence and many of these factors have been examined empirically. General poor health and physical functioning (Laaksonen et al., 2011;
Marmot et al., 1995), psychosomatic complaints and mental health problems (Duijts et al., 2007) are all associated with increased risk of sickness absence, while health behaviour and lifestyle factors such as drinking alcohol and smoking, being overweight and physically inactive also are shown to represent a greater risk of sickness absence (Virtanen et al., 2018). Furthermore, socio-demographic characteristics, notably lower socio-economic status, female gender, older age and living in rural areas, are associated with increased prevalence of sickness absence (Allebeck & Mastekaasa, 2004a; Barmby et al., 2002; Markussen et al., 2011). Family events and family factors such as having experienced the loss of close family members, going through divorce (Allebeck & Mastekaasa, 2004a; Markussen et al., 2011) or being unmarried (Duijts et al., 2007) have also been found to represent a greater risk of sickness absence. At a structural level, labour market conditions and characteristics of the insurance system have been linked to sickness absence in some studies (Allebeck & Mastekaasa, 2004a; Markussen et al., 2011). Regarding work, a previous review article on work factors and the risk of sickness absence showed that particularly works tasks associated with manual occupations (mechanical exposure, repetitive movements and bent postures) increased such risk, while high quantitative demands combined with low degree of control also increased the risk of sick leave. High degree of control at work (skill discretion, decision authority and variation in work tasks) and having a positive social climate in the workplace were associated with reduced risk of sickness absence. A few studies also indicated that the imbalance between effort put in at work and work reward was positively associated with sickness absence (Knardahl et al., 2016). However, the empirical study of broad psychological dispositions and their role in sickness absence is relatively small. In the next section, I summarise research that is relevant to how personality dimensions, human values and attitudes can be related to sickness absence.

**Personality Traits**

Individual perceptions, beliefs and decisions are considered crucial to the complex course of sickness absence (Henderson et al., 2011). Loosely defined as an individual’s characteristic manner of thinking, feeling, and acting (McCrae et al., 2000; Sutin et al., 2016), personality may thus motivate sickness absence behaviour. Personality is commonly captured by the Big Five personality dimensions; neuroticism, extraversion, conscientiousness, agreeableness and openness, which have been associated with a wide range of important life outcomes including family satisfaction, community involvement, criminal behaviour (Ozer & Benet-Martínez, 2006;
Soto, 2019), and health-related indicators and behaviour like self-evaluations of health (Stephan et al., 2020), functional health limitations (Canada et al., 2021), physical inactivity (Sutin et al., 2016), longevity, resilience, coping and substance use (Ozer & Benet-Martínez, 2006; Soto, 2019). Personality is also previously associated with work-related outcomes such as turnover (Salgado, 2002), financial security, occupational commitment and satisfaction (Soto, 2019) and absenteeism (e.g., Furnham & Bramwell, 2006; Sawyerr et al., 2009). Although there has been some research interest pertaining to personality and work absence, previous research has, for the most part, concentrated on a single or a few personality traits as predictors of absenteeism whereas studies that have examined the relationship between personality and sickness absence using a standardised framework for personality are limited (Furnham & Bramwell, 2006; Judge et al., 1997; Salgado, 2002; Vlasveld et al., 2013).

A few previous studies examining the association between the Big Five personality dimensions and sickness absence were identified with three of the studies being based solely on survey data from Germany and the Netherlands respectively (Raynik et al., 2020; Störmer & Fahr, 2013; Vlasveld et al., 2013), while a fourth study included Norwegian population-based survey data linked with register data on sickness absence (Blekesaune, 2012). Furthermore, two other identified survey studies from Norway and the Netherlands examined the association between sick leave and single Big Five personality dimensions (neuroticism: Corbett et al., 2015; conscientiousness: Kok et al., 2017). Five of these identified studies found a positive associations between neuroticism and sickness absence (Blekesaune, 2012; Corbett et al., 2015; Raynik et al., 2020; Störmer & Fahr, 2013), with Vlasveld et al. (2013) showing that neuroticism increased the risk of both self-reported short and long (> 2 weeks) sickness absence spells. Vlasveld et al. (2013) further found a negative association between extraversion and sickness absence, whereas the other studies did not show a significant relationship between these two factors. Regarding conscientiousness, two of the studies found that conscientiousness negatively predicted sickness absence (Störmer & Fahr, 2013; Vlasveld et al., 2013). However, a third study did not find a main effect of conscientiousness in a sample of respondents with and without current affective disorders, but interaction analyses revealed that the positive association between affective disorders and sickness absence was stronger for individuals with high scores on conscientiousness than for those with average conscientiousness scores (Kok et al., 2017). Two studies also showed that agreeableness was related to a lower risk of sickness absence (Störmer &
Fahr, 2013; Vlasveld et al., 2013), while the two other studies that examined this topic did not find an association (Blekesaune, 2012; Raynik et al., 2020). Only one of the studies found an effect of openness showing that openness negatively predicted longer-term sickness absence, but not shorter absence spells (< 2 weeks; Vlasveld et al., 2013).

As reported in the previous paragraph, few studies have examined the relationship between personality dimensions and sickness absence and most of this research have been cross-sectional, largely based on self-reported data and with partly contradictory findings. These circumstances warrant more longitudinal studies that test the association between personality dimensions and sickness absence using highly reliable register data on sickness absence.

**Human Values**

We then move on to human values, a psychological construct that has similarities with personality both theoretically and correlationally (Bilsky & Schwartz, 1994; Parks-Leduc et al., 2015). Human values have also previously been highlighted as a concept that should receive more research attention in the field of absenteeism (Harrison & Martocchio, 1998), but such values have received comparatively less research attention than personality in this field. Before discussing human values, a quick orientation on how previous research has linked work values to work-related outcomes has information value. Work values, that are oriented towards desirable end-states and goals in the work setting, have been linked to job outcomes including work tardiness that was negatively related to extrinsic work values (attitudes towards earnings and upward striving), whereas work performance was positively associated with intrinsic work values (activity preference and pride in work) in cross-sectional survey data from Israeli employees (Shapira & Griffith, 1990). In two survey samples from Belgian employees, Vansteenkiste et al. (2007) found that having extrinsic work values, relative to intrinsic work values, generally predicted less positive job outcomes (i.e., job satisfaction, work dedication) and more negative job outcomes (i.e., turn-over intention, work-family conflict). Moreover, in a study using questionnaire data from a sample of employees in a German logistics company to examine post-retirement work intentions, Wöhrmann et al. (2016) found that work values that were oriented towards the interest in benefiting others (self-transcendence) were positively associated with both intentions to perform voluntary and paid work after retiring, whereas values oriented to work security and authority (conservation) were negatively associated with such post-retirement work intentions. Emphasising values related to work variety and autonomy (openness to change)
positively predicted intentions to do voluntary work when retired, whereas such values, and values emphasising pay and prestige at work (self-enhancement), also were negatively related to intentions to do paid work during retirement. However, the broader construct of universal basic human values has been less studied in the context of work and absence from work.

The Theory of Basic Human Values have identified ten basic human values that are motivationally distinct and form individual value priorities across cultures (Schwartz, 1992, 1994, 2003). Values are defined as basic cognitive orientations and guiding principles for attitudes and behaviour across life domains (Schwartz, 2003). Human values with compatible defining motivational goals can also be grouped into four higher-order basic values that form two bipolar value dimensions with conflicting motivations: self-enhancement values (power, achievement) that are oriented towards the pursuit of personal success and dominance of others versus self-transcendent values (universalism, benevolence) that emphasise the acceptance of others and concern for their well-being; and openness to change values (self-direction, stimulation) that prioritise change and independent thought and action versus conservation values (security, conformity, tradition) that favour traditional practices, stability and submissive self-restriction. A tenth human value, hedonism, oriented towards personal pleasure and sensuous gratification, has elements of both openness to change and self-enhancement (Ros et al., 1999; Schwartz et al., 2001).

Basic human values have been shown to predict a range of various attitudinal and behavioural outcomes such as political activism (Vecchione et al., 2014), internet use (Bagchi et al., 2015), attitudes toward immigration (Davidov et al., 2014), and attitudes to interpersonal violence and violent behaviour (Seddig & Davidov, 2018). These values have also been linked to several health-related outcomes including alcohol use (Nordfjærn & Brunborg, 2015), anxiety and depression (Hanel & Wolfradt, 2016) and mortality (Beller, 2021). Furthermore, human values are shown to correlate with some types of work-related behavioural and attitudinal outcomes in the literature. A recent review covering research on human values in organisational settings, for example, found that human values are relevant for occupational choice, creativity, proactivity, and in contexts of competition and cooperation in the workplace (Arieli et al., 2020). Human values are also found to correlate with types of work values (i.e., what a person wants out of work divided in social, extrinsic, prestige and intrinsic work values) and the general meaning and importance that individuals attribute to work (Ros et al., 1999).
Nevertheless, no empirical studies on the relationship between human values and sickness absence have been identified, but a few studies have examined human values as predictors of behavioural and attitudinal constructs that have some resemblance to sickness absence. Cohen (2009), studying commitment in the workplace, found that particularly benevolence and achievement were consistently positively associated with several types of commitment such as job involvement and organisational commitment. The other human values were also associated with some types of workplace commitment, except conformity and security that did not display any significant relationships with commitment. Using Norwegian survey data combined with register records, Blekesaune (2015) found that achievement and hedonism were prospectively related to a reduced risk of disability retirement, which is an outcome that often follows from long-term sick leave. Lastly, using human values grouped in individual (power, self-direction, stimulation, hedonism, achievement) and collectivistic values (conformity, tradition, benevolence) in the analysis, using Swedish survey data, Haugen et al. (2008) found that individualistic values were associated with tolerant attitudes towards sick leave related to symptoms of illness, while collectivist-oriented values were associated with a greater leniency for sick leave related to personal problems (e.g., marital breakdown). In sum, previous research shows that human values are motivationally important for many types of attitudes and behaviour, also in the workplace, and may thus be associated with attitudes towards sickness absence and actual sickness absence, but there is a lack of previous studies on this topic.

**Attitudes and Sickness Absence**

In continuation of introducing broad personality traits and human values as predictors of sickness absence and attitudes to sickness absence, research on specific attitudes to sickness absence as predictors of sickness absence is also relevant to the further understanding of the arguments in this thesis. As described earlier, despite indications from previous research that attitudes may be part of the explanation for variations in sickness absence, studies that address the relationship between attitudes to sickness absence and actual sickness absence are scarce, but a few cross-sectional studies suggest that such attitudinal factors are associated with the propensity for sickness absence. Using Swedish cross-sectional survey data, Haugen et al. (2008) found that attitudes towards sickness absence due to symptoms of illness and personal problems were positively correlated with sickness absence. Similarly, using survey data from Norway combined with employee records on sickness absence in the survey year, Hauge and Ulvestad
(2017) found that lenient attitudes towards illegitimate and short-term reasons for sickness absence represented a greater risk of self-certified sickness absence, but not physician-certified sickness absence. The length of work absence is also associated with tolerant attitudes to such absence in other cross-sectional survey studies from, for example, Canada (Johns, 2011). Although these studies support that attitudes are related to sickness absence, they do not examine the prospective association between such attitudes and actual sickness absence. More studies are accordingly needed to assess the temporal relationship between these factors, and whether such attitudes may be associated with levels of sickness absence in different sociodemographic groups.

**The Complex Relationship between Gender and Sickness Absence**

As established at the beginning of this introduction, women consistently have higher sickness absence than men in many Western countries. For example, data from the European Union Labour Force Survey show that women averagely were 30% more absent from work due to health problems in a given week than men in the 17 European countries that were included (Mastekaasa & Melsom, 2014). In Norway, women had 79% higher physician-certified sickness absence than men in 2019 (Statistics Norway, 2019). However, the understanding of the mechanisms associated with this gender difference is limited, although many explanations have been investigated (e.g., Mastekaasa, 2016). Gender is thus not only an important predictor in this thesis, but also factors and mechanisms that can help explain gender differences in sickness absence are examined.

In line with stress theory, it has been suggested that women cope with stressful work situations differently from men and that they have lower thresholds for dissatisfying and straining working conditions, which may be related to sick leave (Darr & Johns, 2008). However, stress theory has also been applied to settings outside of work, such as the family situation, and used in conjunction with sociological role theories to address gender differences in sickness absence. From this perspective, stress and ill health is hypothesised to accrue due to role overload and role conflict particularly among women because they, to a greater extent than men, carry the burden of family responsibilities combined with workforce participation (also named the ‘double-burden’ hypothesis; e.g., Allebeck & Mastekaasa, 2004b). Traditional gender stereotypes related to women and their historical role as responsible for the home domain and family care may also be related to gender differences in the legitimation of sickness absence (Hellevik et al., 2019). Although gender equality has come a long way, particularly in Norway, women still spend more
time on tasks at home and men spend more time at work (Hellevik et al., 2019; Kitterød & Lappegård, 2012), which could lead to men and women making different assessments and priorities, and therefore having different views and attitudes to sickness absence. In addition, such gender stereotypes and differences in role distribution may also be related to gender differences in the expectation and legitimisation of sickness absence at the societal level (Hellevik et al., 2019).

So far, notably women’s reproductive role, women’s excess burden of household and family duties combined with paid work, and differences in exposure and reaction to work and employment conditions between men and women have been empirically examined as explanations for the gender difference in sickness absence. Pregnancy-related health issues have been found to explain just over half of this gender gap in sickness absence for the age group that mainly is of childbearing age (20–39 years old; Mastekaasa, 2016), whereas the hypothesis of ‘double burden’ have so far received limited support (Mastekaasa, 2016; Rieck & Telle, 2013). Differences in mostly self-reported psychosocial working conditions have been shown to slightly reduce the gender gap in sickness absence in some studies from Norway (Sterud, 2014) and Denmark (Labriola et al., 2011). Other studies, primarily from Norway and controlling for detailed occupational categories, show, however, that working conditions have little effect on the gender gap (Mastekaasa & Dale-Olsen, 2000; Mastekaasa & Melsom, 2014; Melsom & Mastekaasa, 2018), while studies do not indicate that different reactions to work conditions are important explanations for the gender difference in sickness absence either (see Mastekaasa, 2016). Accordingly, more studies examining mechanisms that may explain this gender difference are needed. That attitudinal factors contribute to gender differences in sickness absence has been proposed, but these factors have received limited research attention (Hauge & Ulvestad, 2017).

Some popular attitude explanations for the gender difference in sickness absence that have been put forward are that men and women have different cultures for the use of sickness absence, that women have different priorities than men when it comes to important arenas such as work and family, and that women struggle because they have too high demands for success in too many arenas in life (Hellevik et al., 2019). Consider, for example, these statements from a senior researcher at the Norwegian Institute of Public Health, and the Minister of Labour in Norway at the time, respectively, which reflects widely circulated points of view in the public debate on how attitudes can lead to higher sickness absence among women: “Do women encourage each other to
‘listen’ to the body’s signals? … Is being on sick leave more stigmatising for men?” (Mykletun, 2014a); “Do women and men have different views on whether illness can be prevented in the event of sick leave? Or whether sick leave should be used to shield oneself from an unpleasant working environment?” (Mykletun, 2014b); and “Do men go to work even if their health is ailing a bit, while we (ed.: women) do not consider work as equally important in life? … Do men care for each other by asking the colleague to return to work as soon as possible, while we (ed.: women) are quick to emphasise to our female colleague that she should stay at home as long as she feels like it? … Are there requirements for success that make women exhausted?” (Huitfeldt, 2014).

A previous study that examined absenteeism in a survey study of 444 Canadian employees, found that women indeed were more tolerant of absenteeism than men measured by statements like “when employees are absent from work, they usually have a valid reason” and “absence from the workplace is a legitimate behaviour” (Johns, 2011). However, findings from the few studies that have addressed gender differences in attitudinal factors related to sickness absence are mixed. Using survey data, combined with contemporary employer records on sickness absence, from a sample of 226 employees in the public health service in one municipality in Norway, Hauge and Ulvestad (2017) found no gender difference in the leniency of attitudes towards sickness absence that were measured by items mainly covering potential reasons for short-term absence (e.g., having a cold and low-grade fever) and items addressing illegitimate reasons for absence (e.g., having a hangover due to alcohol consumption). A second Norwegian study, using time-series survey data, found that women were slightly more inclined than men to accept unjustified absence (i.e., staying home from work although one is, strictly speaking, healthy enough to attend work). The study also examined sickness absence attitudes measured by a set of seven items that, apart from the item “feeling tired or exhausted”, were related psychosocial work or family issues that do not qualify as legitimate reasons for sickness absence according to the medical criteria in the Norwegian system (e.g., difficulties in connection with marital breakdown) and women were also slightly more tolerant to absence than men for all the stated reasons (Hellevik et al., 2019). Furthermore, a recent study by Mastekaasa et al. (2021), using a sample of 899 Norwegian managers and a vignette survey design, did not find gender differences in the leniency to attitudes towards physician-certified sickness absence due to mainly health-related reasons or gender differences in the acceptance of women’s compared to men’s
sickness absence. Another study, however, examining press coverage of work absence in the *New York Times* using 167 newspaper articles covering a time span extending from before World War II until the mid-2000s found greater societal acceptance of women’s absence from work than men based on stereotypes of women’s greater role as caregivers and their prioritisation of the family domain (Patton & Johns, 2007). A third study, in line with Mastekaasa et al. (2021), who also used vignette data but examined judgements of the responsibility for absenteeism, found no gender differences in judgments based on either the respondent’s gender or the gender of the vignette person in a sample of 454 American managers and professionals in the field of information technology (Patton, 2011).

In summary, these sparse and partly conflicting results call for more research on gender differences in attitudes towards sickness absence to determine whether it is likely that this may be a contributing factor to women’s higher sickness absence. Different findings may be attributed to methodological issues between studies related to study design and measures of attitudes towards absence. Since women are primarily overrepresented in physician-certified sickness absence in Norway (Statistics Norway, 2019), more studies are needed to investigate whether there are gender differences in attitudes towards such absence and whether attitudes in the general population are more tolerant of women’s than men’s physician-certified sickness absence.

To sum up this introductory chapter, the research literature shows that a myriad of factors are associated with sickness absence, but that knowledge about the role of dispositional factors in predicting sickness absence is limited, although both personality and human values have previously been pulled forth as under-researched and promising factors for studying the dispositional basis of work absence and attitudes to absence (Harrison & Martocchio, 1998; Haugen et al., 2008). Moreover, previous research on this topic is largely based on absence data over periods covering six months to one year. However, the annual cycle of an absence period includes, for example, external pressures related to the depletion of sick days towards the end of the year and potential organisational changes such as downsizing in a given year. It is therefore argued that data on longer aggregation periods of absence are needed to gain insight into individual behavioural persistence across the one-year interval of absence. Another aspect is that predictions are suggested to be more precise and meaningful when the time frames of the predictor and the period of absence are compatible (Harrison & Martocchio, 1998). Thus, the use of personality and human values, which are relatively stable factors across time and situations, as
predictors of sickness absence beyond one year in two of the papers in this thesis, can provide a
deeper insight into the relationship between these factors. By examining whether men and
women have different thresholds for physician-certified sickness absence in the third paper, this
thesis can further provide research-based knowledge about the popularly proposed hypothesis
that attitudes are an explanatory factor for the gender difference in sickness absence.

**Research Objectives**

The main purpose of this thesis is to provide expanded and new knowledge on
psychological predictors of sickness absence by examining whether personality and human
values are associated with variations in sickness absence. A second objective is to investigate
whether another psychological factor, namely attitudes to sickness absence, differ for men and
women, and thus might contribute to the understanding of mechanisms behind the gender gap in
sickness absence. The two first papers in this thesis examined the longitudinal association of
either personality or human values with sick leave, whereas the third paper examined gender as a
predictor of attitudes to sick leave.

**Paper I**

The aim of the first paper in this thesis was to investigate whether personality dimensions
were prospectively associated with register-based, longer-term sickness absence, which usually
represents a greater degree of illness than shorter self-certified spells of sickness absence. A
second aim of the paper was to examine whether key factors associated with sick leave
moderated the association between personality dimensions and sickness absence. Using cross-
sectional survey data and longitudinal register data on sickness absence from 5,017 Norwegian
employees, we hypothesised that neuroticism was related to a higher risk of sickness absence,
and that conscientiousness and agreeableness were related to a lower risk of sickness absence.
We did not state prefatory hypotheses for the direction of the relationships between extraversion
and openness with sickness absence. We further expected that employee health, age, gender, type
of occupation and job satisfaction could act as moderators of the personality-sickness absence
associations.

**Paper II**

The second paper in this thesis examined whether human values where predictive of
attitudes towards sickness absence, in addition to examining the associations between human
values and actual self-reported or register-based sickness absence. The basis of this paper rests, as
in the previous paper, on the assumption that beyond purely health-related reasons there may be psychological dispositions that are associated with differences in sickness absence. Using longitudinal survey and register data from 1,330 middle-aged Norwegian employees, we hypothesised that self-enhancement and conservation values were associated with stricter attitudes towards sickness absence and that openness to change and self-transcendence values were associated with more tolerant attitudes towards sickness absence. We also hypothesised that conservation and self-transcendence values were related to lower and higher risks of actual sick leave, respectively.

**Paper III**

The third paper in this thesis followed up on the topic of the two first papers on psychological dispositions and their association with sickness absence, but in an indirect manner. The aim of this paper was to examine whether gender differences in attitudes towards sickness absence are contributing factors to the gender difference in sickness absence. The paper investigated whether gender differences in attitudes towards sickness absence exist in three ways: (1) whether women have more tolerant attitudes to sick leave than men; (2) whether the general attitudes (i.e., social norms) among the population to a greater extent accept sick leave for women than for men; and (3) whether the acceptance of sick leave is greater for female-dominated occupations than for male-dominated or gender-balanced occupations. The study was based on data from 1,800 Norwegian employees collected through a factorial vignette survey with an experimental condition in 2016. We tested the assumption that the gender difference in sickness absence can be an expression of the fact that women and men have different views on when sick leave is necessary, and that women and men are subject to different thresholds in society for when sick leave is considered legitimate.

**Data and Methods**

The papers in this thesis applied data from two Norwegian studies. The two first papers used data from the *Norwegian Life-Course, Ageing and Generation Study* collected by Statistics Norway in collaboration with Norwegian Social Research (NOVA) at Oslo Metropolitan University. The third paper used a data set that was derived from a survey designed in connection with the research project *Explaining social patterns in sickness absence: the influence of values, attitudes and norms* (SAVAN) at NOVA and the data were collected by Kantar TNS in 2016. In
the following, this section provides a comprehensive account of the data and methods used in the
three thesis papers starting with the description of study procedures and participants, and
followed by information on ethical aspects, study measures, and statistical analysis.

**Procedures and Participants**

**The Norwegian Life-Course, Ageing and Generation Study (Papers I and II)**

Both Paper I and Paper II are based on samples from the Norwegian Life-Course, Ageing
and Generation Study (NorLAG). This is a three-wave longitudinal study that combines interview
data, with survey and register data. Statistics Norway collected all three waves of data in
 collaboration with NOVA. In all three study waves, respondents were first interviewed through
computer-assisted telephone interviews and then asked to fill out either paper- or web-based, self-
completion questionnaires. Furthermore, a rich amount of register data was linked to interviewee
data in the interview year and longitudinally in the years between the study waves (see Veenstra
et al., 2021).

The two papers did not use data from the first wave of NorLAG (T1) that was conducted
in 2002, but a short description of the sample in T1 still has information value since the two
consecutive data collections in NorLAG partly build on the T1 sample. T1 was coined as a
longitudinal life-course study of middle-aged and older persons (40 years and older) using a
sample stratified by age and gender to represent non-institutionalised individuals born between
1922 and 1961 in 30 municipalities and urban districts in Norway. The total eligible sample at T1
counted 8,298 individuals and the response rate was 67% (N = 5,555; see Veenstra et al., 2021,
for more information on the sampling and study procedure for NorLAG T1).

The sampling in the second round of NorLAG (T2; 2007) built on the entire gross sample
of T1, but was additionally supplemented with refereshment samples for the birth cohorts born in
1922–1961 and a group of younger birth cohorts born between 1962 and 1966. Moreover, the
sampling was expanded to represent the whole of Norway, divided in seven geographical areas,
and was accordingly no longer restricted to a limited number of municipalities and urban
districts, as was the case at T1. The sample further was stratified by gender, age, geographical
region and the centrality of the residential municipality (most central to least central). The total
eligible sample at T2 counted 15,094 individuals and the response rate for the interview was
61%, which resulted in a sample of 9,238 respondents between 40 and 85 years old at the time of
the interview. Of those interviewed, 77% \((n = 7,129)\) also returned the self-completion questionnaire (overall response rate of 47%; see Veenstra et al., 2021).

The third round of NorLAG (T3) was conducted in 2017. At T3, eligible participants comprised all living individuals born in the years 1922–1966 that had responded to at least one of the two previous data collections (T1 and/or T2). In total, 8,945 previous NorLAG respondents constituted the eligible sample at T3 (Veenstra et al., 2021). The net sample of respondents at T3 covered 6,099 individuals that were between 50 and 95 years old during the interview (response rate of 68%) and 73% of the interviewees returned the self-completion questionnaire in this round \((n = 4,461;\) overall response rate of 50%). Overall, non-response bias was small at T2 and T3, but non-responders more often had basic education, thereby leading to respondents with higher education (college or university level) being somewhat overrepresented both at T2 and T3. Respondents that reported good self-rated health were additionally more likely to participate in multiple rounds of the NorLAG data collections (Veenstra et al., 2021).

As described above, the second data collection was based on the gross sample of T1 with added refreshment samples for the birth cohorts 1922–1961 and a new set of birth cohorts born between 1962 and 1966. However, at T2, the NorLAG study was also merged with the United Nations-initiated Generations and Gender survey that was designed to study different subjects and life-course processes in the general adult population in Europe. Consequently, sampling at T2 further included another new set of birth cohorts born between 1967–1988, which was also stratified by gender, age, geographical region and municipal centrality to represent the whole of Norway for individuals in the age range 18–39 years. In total, this expanded data collection comprised a nationally representative sample of 14,884 respondents between the ages 18–79 years old at the time of the interview. The extended data collection is also labeled LOGG (The Life-course, Generation and Gender study) in some publications (e.g., Slagsvold et al., 2012), but since the birth cohorts born between 1967–1988 were not followed-up in the subsequent third round of NorLAG, we will simply refer to this data set as the extended NorLAG T2 data collection \((eT2)\) in the following.

The response rate of the interview in \(eT2\) was 60% and 73% of the interviewees also returned the subsequent self-completion questionnaire (overall response rate of 44%). Non-response bias for the interview was somewhat higher for the youngest part of the sample (18–29 years old) and for individuals with basic education. Similar patterns of non-response also applied
to the self-completion questionnaire in addition to men being somewhat less likely to return the questionnaire. Accordingly, the net sample of those that returned the questionnaire was overrepresented by women (4 percentage points), underrepresented by the youngest age groups (18–29 years and 30–39 years underrepresented by 4.6 and 1.4 percentage points respectively) and underrepresented by individuals with only basic education by eight percentage points (see e.g., Statistics Norway's documentation report on the extended NorLAG T2 data collection for more study details: Bjørshol et al., 2010; Slagsvold et al., 2012). The analyses in Paper I used survey weights to adjust for biased survey participation (see more information on the calculation of the survey weights under Statistical Analysis in this chapter).

**Paper I.** The first paper (Paper I), used cross-sectional interview and survey data from the second, extended round of NorLAG (eT2; 2007) that was linked to individual register data on sickness absence in the interview year and four years after (2007–2011). Several inclusion criteria for the study sample were set in order to have a sample with relatively similar terms for receiving sickness benefits. Our study period, including register data, covered the years 2007–2011, and therefore we limited our sample to respondents who were not older than 66 years or retired by 2011, who stated that they were employed, not self-employed, during the interview, who had paid work in the past week and worked a minimum of 15 hours per week, and who annually earned enough to be entitled to sickness benefit throughout the study period (minimum 50% of the yearly public pension base rate). With these selection criteria and the prerequisite that the respondents had returned the self-completion questionnaire, where personality was measured, the study sample counted 5,017 respondents who were aged 18–62 years at the time of the interview (M = 41.80; SD = 10.3; see Figure 1 for a flow chart of the selection of this study sample). Just over half of the sample were women (54.7%), almost half of the sample (47.1%) had higher-level education (college or university) and 75.8% of the sample were living with a partner at the time of the interview. Register records showed that 43.9% of the sample had at least one sickness-absence spell in the four years following the year of data collection.
We also compared the study sample in Paper I (SS) with those that filled the requirement for receiving sickness benefits during the study period, as described above, but who did not return the self-completion questionnaire (noSCQ). The analyses showed that the respondents in the study sample were somewhat older compared to those who did not answer the postal questionnaire (SS: $M = 41.8$; noSCQ: $M = 37.8$; $t = 14.20$, $p < .001$), that the study sample had a significantly higher proportion of female respondents (SS: 54.7%; noSCQ: 36.0%; $\chi^2 = 188.9$, df = 1, $p < .001$) and a significantly higher proportion of respondents with higher level education (SS: 47.1%; noSCQ: 36.7%; $\chi^2 = 58.7$, df = 1, $p < .001$). Moreover, the study sample had a slightly higher share of respondents with a long-term or chronic health problem (SS: 20.4%; noSCQ: 17.8%; $\chi^2 = 6.1$, df = 1, $p = .014$), but the two samples did not significantly differ in the proportion of respondents that had register-based sick leave in the years after the interview (SS: 43.9%; noSCQ: 42.0%; $\chi^2 = 1.8$, df = 1, $p = .179$).

**Paper II.** In Paper II, both interview and survey data from the second and third round of NorLAG combined with longitudinal register data were used. For the sake of simplicity, T2 and T3 will be referred to as baseline and follow-up, respectively, in the description of the sample in Paper II from now on. Since we wanted to study attitudes towards sick leave and actual sickness absence in a sample of respondents who were entitled to sick leave, the study sample was limited to baseline respondents who were interviewed at follow-up ($n = 5,711$), because attitudes towards sick leave were only measured at follow-up. The respondents had to meet certain inclusion criteria to be eligible for sickness absence throughout the study period. They needed to be
employed in both rounds (n = 2,272), and earn 50% of the public pension base rate annually (approximately 40,000 NOK) throughout the 10-year study period (n = 2,104), be below 67 years of age at follow-up (n = 1,989), and to have returned the self-completion questionnaire both at baseline and follow-up, which resulted in a study sample of 1,330 respondents aged 40 to 57 years (M = 47.65; SD = 4.42; see Figure 2 for a flow chart of the study sample selection). Women (55.9%) and those living with a partner (83.2%) were overrepresented in the study sample. Close to half of the respondents had higher-level education (47.9%), whereas relatively few were living with younger children (< 11 years old) in the household (23.1%). Most respondents worked full-time (83.2%) and reported to be in good health (89.4%). Register records on sick leave showed that 16.7% of the sample had register-based sick leave in the year prior to baseline (2006), that 60.3% had register-based sick leave in the years between baseline and follow-up (2008–2016), and that 45.9% self-reported that they had sick leave in the year prior to follow-up.

We also compared the sample of respondents who returned the self-completion questionnaire in both rounds with respondents who participated in the interview in both rounds, but did not return the self-completion questionnaires, on multiple relevant study characteristics. The analyses showed that the former group of respondents were minimally older (t = 2.57, p = .011; 47.5 years versus 46.6 years) and had a higher probability of being female (χ² = 30.2, df = 1, p < .001; 53.6% women versus 31.3% women). However, the two samples did not

---

**Figure 2**: Flow chart of the Norwegian Life Course, Ageing and Generation Study, longitudinal sample (2007, 2017).
significantly deviate from each other with regard to educational level, self-rated health or register-based sick leave in the years between baseline and follow-up \((p > .05)\).

Vignette Study (Paper III)

Paper III in this thesis used data from a vignette study with factorial survey experiment that was conducted in spring 2016. The study sample was drawn from a general-purpose, web-based panel owned and managed by Kantar TNS, the market research firm that was commissioned to perform the data collection on behalf of NOVA. The Kantar panel comprises around 45,000 participants aged 15 years and older who are recruited to be part of the panel to routinely participate in various surveys conducted by the firm. The participants are invited to take part in the panel with the goal that it is as representative as possible of the Norwegian population. Panel participants are rewarded with points per each survey answered, and points can be exchanged for gifts or gift vouchers of various kinds, or given as monetary donations to charitable causes, but participation in the panel is voluntary, and participants can withdraw from the panel at any time or refrain from participating in the surveys to which they are invited to respond. Participants are asked to provide basic background information about themselves when they register to be part of the panel. This information serves to select respondents for future surveys and being employed was the only requirement to be eligible for the vignette survey. A total of 26,450 panel participants filled this requirement.

A random, gender stratified, sample of 3,700 eligible panel participants was selected to receive the web-based study questionnaire that included questions on basic sociodemographic information about the respondent and six hypothetical sick leave scenarios (i.e., vignettes) to be rated by the respondent. Of the invited participants 59\% (\(n = 2,176\)) opened the questionnaire, and 66 of these invitees did not finish the questionnaire, whereas 310 invitees were unable to open the form because the available number of unique questionnaire versions was already completed. This recruitment procedure guaranteed that 1,800 respondents (50\% of whom were women) completed the questionnaire, which was needed to fulfil the experimental part of the survey. The average age of the sample was 47 years (\(SD = 14; \text{range 18–83}\)). Almost half of the sample (48.8\%) had higher-level education (college or university) and just above two thirds of the sample (69.1\%) were living with a partner. There was as a 13.5 percentage-point gender difference in self-reported sickness absence of minimum one sickness absence spell the last twelve months (58.8\% women and 45.3\% men reported sickness absence).
The vignettes were short verbal scenarios with a male or female person that had a specified occupation and a specific medical diagnosis that was indirectly described by the typical symptoms associated with the diagnosis. The purpose of the vignettes was to measure the respondents’ judgements of whether physician-certified sickness absence was considered legitimate in the various scenarios. More details about the vignettes such as response options and examples are described in the Measures section later in this chapter. The main aim was to study gender across a large number of situations that were carefully designed to resemble real-life decision-making scenarios. Accordingly, in addition to gender, we systematically selected 90 occupations and 30 diagnoses that were to vary randomly in the vignettes. The occupations were chosen from the Norwegian State Register of Employers and Employees, and a third of the occupations represented different levels of female-dominated occupations that were either considered occupations with high, medium or low status. The same principles were used to select the other two thirds of gender-balanced and male-dominated occupations, respectively. Statistics from the Norwegian Labour and Welfare Administration on diagnostic categories for physician-certified sickness absence were used to select diagnoses for the vignettes. We chose the diagnostic categories that were most frequently applied such as mental illness, musculoskeletal disorders, headaches and dizziness, contagious respiratory illnesses and pregnancy complications. Instead of medical diagnosis, 13% of the vignettes comprised the description of work- or family-related psychosocial issues (e.g., work conflict or having a sick family member in need of care), which in the respondent’s view may also justify sick leave.

Each survey questionnaire included six vignettes. By combining all versions of the three vignette factors, the number of unique vignettes was 5,400 (90 occupations x 30 diagnoses or psychosocial issues x 2 genders). These unique vignettes were divided into 900 questionnaires (5,400 vignettes / 6 vignettes per questionnaire). All occupations and diagnoses yielded 2,700 exhaustive combinations (90 x 30). These combinations were assigned six and six to form 450 questionnaires where none of the questionnaires included vignettes in which the same occupation or diagnosis was mentioned. Furthermore, to ensure gender balance between the vignettes and between respondents judging each set of vignettes in the 450 questionnaires, three vignettes per questionnaire were assigned to a male vignette person, while the other three were assigned to a female vignette person. Apart from vignettes with pregnancy-related diagnoses, the gender of the vignette person was randomly assigned to the vignette, and the order of the six vignettes
presented in each questionnaire was also random. These 450 questionnaires were then duplicated, but the gender distribution of vignette persons was reversed in the duplicate forms, resulting in 900 unique questionnaires. These 900 questionnaires were then randomly distributed to the 900 male and 900 female respondents, which ultimately yielded 10,800 vignette judgements. Figure 3 provides an overview of the design and sampling in the vignette study.
Figure 3. Overview of the design of the vignette study.
Ethics

The studies in all three papers included in this thesis and the wider thesis discussion were performed in conformity with the guidelines for research ethics provided by The National Committee for Research Ethics in the Social Sciences and the Humanities (NESH). The Data Protection Official for Research at Statistics Norway reviewed the data collection and procedure of the study that was used in Papers I and II. Moreover, the procedures for every round of data collection for this latter study were conducted in line with the regulation of the Statistics Act for official statistics disseminated by Statistics Norway that was the ruling regulation at the time of the three rounds of data collection (The Statistics Act, 1989; Veenstra et al., 2021). The study used in Paper III in this thesis was conducted in accordance with the routine of notifying the Norwegian Centre for Research Data. For the studies in Papers I and II, I also applied to the Norwegian Centre for Research Data to use the NorLAG data in these two papers on the basis of the description of the research ideas for the papers.

The data in Papers I and II are openly available for research purposes to students and researchers that are affiliated with a Norwegian research institution. This conditional access to the data is in place due to the substantial linkage to Norwegian register data owned by Statistics Norway. Such data are not allowed to be stored outside of Norway. The Norwegian Centre for Research data distributes both data sets (data used in Paper I can be accessed at https://doi.org/10.18712/NSD-NSD1461-V1; data used in Paper II are available at https://doi.org/10.18712/norlag3_1). The data in Paper III are freely available as supplement to the paper at https://doi.org/10.1371/journal.pone.0200788.s001. By using data that are easily accessible to other researchers, the papers in this dissertation also contribute to transparency and verifiability in research in this respect.

The data used in all three articles in this thesis did not contain any kind of personal identifiers and all data handling and analyses were consequently performed on unidentifiable data. Respondents in the study that formed the basis of the data used in Papers I and II were first invited either by post or via e-mail with a brochure that informed about the aim of the study, the course of the data collection and that participation was voluntary. The respondents were subsequently contacted by telephone to confirm their participation (Veenstra et al., 2021). The interviewers completed a training course before the data collection where they were, amongst others, trained in dealing with questions that could feel sensitive or demanding for the
interviewee (Bjørshol et al., 2010). In Paper III, the data were based on an online survey in which
the invited respondents were already consenting participants in a general-purpose web panel run
by the research market firm that conducted the survey. The respondents were contacted by e-mail
and asked if they were willing to participate in a survey on attitudes towards sick leave.
Respondents were informed that participation was voluntary and that their responses would be
treated confidentially. The respondents were also assured that they could withdraw from
participating in the survey and in the respondent panel at any time and that their contact
information would not be given to third parties. By returning the completed survey, the
respondents gave their final consent to participate in the survey.

Some final ethical assessments that are worth mentioning in this thesis concern the
general focus on psychological predictors of sickness absence and the particular focus on gender
differences in sickness absence and / or attitudes towards sickness absence. By studying
psychological risk factors for sickness absence, i.e., personality, human values and attitudes, such
research can lead to stigmatisation of individuals who seek sick leave or who are on sick leave,
because this focus on psychological factors may be interpreted as a latent assumption that there is
thus no real reason to be on sick leave. It has therefore been important to point out that this thesis
aims to examine whether these psychological factors can contribute to understanding the complex
course of sickness absence, not unfounded sickness absence, and thereby can potentially provide
knowledge that helps to prevent longer-term absences from work and from the labour market.
Moreover, the focus on gender is a potentially sensitive topic that is particularly relevant in Paper
III where gender is the main predictor. By investigating gender as a predictor of attitudes towards
sickness absence on the basis of the overrepresentation of women in sickness absence, this focus
can be perceived as a suspicion of women’s sickness absence and that the legitimacy of this
absence is questioned. This ethical assessment was thus particularly prominent during the writing
of Paper III and the results in the paper are discussed with extra caution to minimise the
possibility that the finding of one of the analyses is used in a selective manner or misinterpreted
as women generally taking sick leave (too) leniently, since such a misinterpretation, at worst, can
be damaging to gender equality in the labour market.

Measures

*Sickness Absence (Papers I and II)*
Data on register-based physician-certified sickness absence from Statistics Norway’s Historical Event Database were linked to individual survey data in Papers I and II. These data contain information on the length of sickness benefits that the respondent has received from the Norwegian National Insurance Scheme. The employer normally covers the first 16 calendar days of physician-certified sickness absence, while the insurance scheme covers the costs from the 17th calendar day of absence. The records comprise the sum of register-based sick leave days per year and thus only provide information on sick leave that lasts longer than 16 days. In Paper I, annual data on register-based sickness absence in the four years after the interview year were collapsed and used as study outcome. The outcome variable was calculated as the sum of working weeks (1 week = 5 workdays) for which the respondent had received sickness benefits during these four years (2008–2011; M: 8.72, SD: 16.95, Min: 0, Max: 121). Register-based data on sick leave in 2007 were also used as a control for previous sick leave spells in Paper I (no = 0; yes = 1).

In Paper II, both register-based and self-reported sick leave were used as study outcomes. In this paper, data on register-based sick leave were recoded into a dichotomised outcome variable that informed whether the respondent had such sick leave in the years between baseline and follow-up (2008–2016; no = 0; yes = 1). The same type of register data was additionally used as a control for previous sick leave in the year prior to baseline (2006; no = 0; yes = 1). Self-reported sick leave was measured in the telephone interview at follow-up by the item “Have you been absent from work because of your own illness in the past 12 months” with the two response alternatives coded as no (0) and yes (1).

**Attitudes towards Sickness Absence (Papers II and III)**

The studies in both Papers II and III included measures on attitudes towards sickness absence. In Paper II, attitudes towards sickness absence constituted the outcome variable and attitudes were measured by a battery of eight items in the self-completion questionnaire at follow-up, modeled according to a similar battery of items used in the Norwegian Monitor survey (Ipsos MMI, 2015). The items covered potential reasons for sick leave such as symptoms of illness, work-stress and demanding family-related situations and were presented with the introductory sentence “For how long do you think it is acceptable to be on sick leave for the following reasons…?”. Examples of illness-related reasons were “…a common cold with mild fever” and “…having the flu or the like”, whereas “…great pressure or stress at work” and “…difficulties related to marital breakdown” constituted examples of work- and family-related
reasons, respectively. The response options were no reason for sick leave (0), sick leave for 1–3 days (1), up to 2 weeks of sick leave (1), up to 4 weeks of sick leave (1), more than 4 weeks of sick leave (1) and don’t know. The latter response option was counted as missing responses. Valid responses were used to construct an attitude index that calculated the mean number of reasons that the respondents considered sick leave for 1–3 days or longer to be acceptable. Cases that had missing responses on more than 50% of the items were excluded from the index (n = 144). The sample mean score on the attitude index was 0.64, which showed that the respondents on average accepted sick leave more often than not across the eight items. The scale’s alpha value was .67.

Attitudes towards sickness absence were also used as outcome variable in Paper III, but the measuring instrument was different from that in Paper II. Attitudes were measured by presenting hypothetical sickness absence scenarios (i.e., vignettes) for the respondents to judge. Using vignettes is considered a more precise way to obtain information on respondents’ judgement principles compared to, for example, single-item questions (Auspurg & Hinz, 2015). Each vignette described an employee, female or male (i.e., the vignette person), with a named occupation and symptoms of a specific health issue. The vignettes were introduced with the information that the vignette-person already has been home from work for three days of self-certified sick leave and still feels that he / she needs additional time at home before returning to work. The respondents were asked to judge the legitimacy of sick leave for each given vignette with the response options perfectly unreasonable (1), fairly unreasonable (2), fairly reasonable (3) and perfectly reasonable (4), and don’t know. Here is an example of a complete vignette where the diagnostic category is musculoskeletal disorders and where the symptoms of neck and shoulder afflictions are described:

Frank works as a postal worker. He is afflicted with a stiff and painful neck and pain in both shoulders. The pain is not very strong, but present as a more or less constant ache. He notices a tendency of improvement when he can take it easy, while the pain is aggravated by stress. Frank has been at home for three days of self-certified sickness absence but thinks that he needs more time before he returns to work. How reasonable or unreasonable do you think it is that Frank receives a physician-certified sick leave in this situation?
For analysis purposes, the sick leave judgements were divided into the three possible combinations of response cut-off points (**fairly unreasonable**, **fairly reasonable** and **perfectly reasonable** [0] vs. **perfectly unreasonable** [1]; **fairly reasonable** and **perfectly reasonable** [0] vs. **perfectly unreasonable** and **fairly unreasonable** [1]; **perfectly reasonable** [0] vs. **perfectly unreasonable**, **fairly unreasonable** and **fairly reasonable** [1]). **Don’t know**-responses were excluded from the analyses (4.2% of the responses; n = 428). In Paper III, the cut-points of vignette judgements were also used to measure the social acceptability of sick leave (i.e., social norms) based on the gender of the vignette person and the proportion of women in the occupation. Of the 10,800 vignettes, 720 vignettes concerned a female with pregnancy-related diagnostic categories. These vignettes were excluded from all analyses because they would violate the experimental condition of the survey that required equal numbers of people of both genders described in the vignettes. The 4.2% of the vignettes with the response **don’t know** were also excluded from the main analyses, leaving 9,652 vignette judgements as the analytical unit.

**Personality (Paper I)**

Personality dimensions constituted the main predictor variables in Paper I. A Norwegian 20-item short version of the Big Five Inventory (BFI; John & Srivastava, 1999) assessed personality in the self-completion questionnaire (Engvik & Clausen, 2011; Engvik & Føllesdal, 2005). The BFI has shown satisfactory reliability and cross-cultural validity in many samples (Engvik & Føllesdal, 2005; John & Srivastava, 1999), and the Norwegian short version of the BFI also has demonstrated adequate reliability and validity in several samples (Engvik & Clausen, 2011). The five personality dimensions were each measured by four items that consisted of short characteristics of traits central to the dimension. The phrase “I am typically someone who …” introduced the items. Two of the items, for example, that measured the neuroticism dimension were “ …worries a lot” and “ …gets nervous easily”. The response options were ranged on a seven-point scale from **fits poorly** (1) to **fits well** (7) based on how well the characteristics fitted to the typical state of the respondent.

Mean scores for each personality dimension were calculated and later standardised for analysis purposes. Both omega total ($\omega_t$) and Cronbach’s alpha ($\alpha$) were used to assess the reliability of the personality scales, because of relatively modest coefficient alpha values for some of the traits (openness: $\omega_t = .70$, $\alpha = .65$; conscientiousness: $\omega_t = .64$, $\alpha = .57$; extraversion: $\omega_t = .85$, $\alpha = .79$; agreeableness: $\omega_t = .67$, $\alpha = .54$; neuroticism: $\omega_t = .73$, $\alpha = .72$). Some reports
suggest that omega values are a better indicator of the internal consistency of unidimensional scales when tau equivalence is violated and that coefficient alpha tends to underestimate the true reliability (e.g., McNeish, 2018). Although a few of these reliability estimates were in the lower range (both alpha and omega values), they are comparable to reliability scores commonly observed in other survey studies using brief personality scales, and are interpreted as an expression of the few, content-heterogeneous items that were used to measure broad personality constructs (Engvik & Clausen, 2011; Lang et al., 2011).

**Human Values (Paper II)**

In Paper II, human values were the main predictors of interest. Human values were measured at baseline by the Human Values Scale (HVS), which is a short version of the original Portrait Values Questionnaire (PVQ), that was developed for the European Social Survey (ESS; Schwartz, 2003; Schwartz et al., 2001). The 21 HVS-items were part of the self-completion questionnaire and each item described key goals and ambitions to the value using short verbal portraits of a hypothetical person (Schwartz, 2003). Two items each, three for the value of universalism, measured the ten human values, and the phrase “It is important to this person …” introduced the items which the respondents were instructed to rate based on how similar this person was to themselves. The response options were very much like me (1), like me (2), somewhat like me (3), a little like me (4), not like me (5) and not like me at all (6). The HVS was slightly adjusted to be more tuned to the cultural context of the NorLAG study: the items were gender-neutral instead of addressing the respondent according to his/her gender; one phrase, not two, were used for each item, and; one of the items that measured the value of security in the HVS (“It is important to him/her that the government ensures his/her safety against all threats. He/she wants the state to be strong so it can defend its citizens”) was exchanged with “It is important to this person that things be organised and clean”.

Following the suggestion by Schwartz (2010), the scale scores were mean centered to correct for individual differences in scale use. The scores accordingly represented the relative priority of each value in the respondent’s value system. The reliability coefficients for the human values ranged from .36–.70 with .54 as the average value (power: $\alpha = .39$; achievement: $\alpha = .55$; hedonism: $\alpha = .67$; stimulation: $\alpha = .70$; self-direction: $\alpha = .36$; universalism: $\alpha = .62$; benevolence: $\alpha = .68$; security: $\alpha = .46$; tradition: $\alpha = .37$; conformity: $\alpha = .64$). Although these coefficients appear to reflect a low to moderate reliability of the value scales, this range of
reliability values was not unexpected and is considered the manifestation of the few and rather heterogeneous items selected to cover conceptually broad value types. For example, the total average alpha reliabilities in samples from six countries (Finland, Israel, Poland, Slovenia, Sweden and the United Kingdom) for the human values ranged from .39–.75 with an average of .58. In Slovenia values ranged from .35–.67 with .51 as the average value (Schwartz, 2003). As part of the biennial ESS study since the first survey round in 2002, the HVS has become a widely used and well-established scale that has shown adequate validity in samples across a wide variety of countries and cultures (Schwartz, 2003, 2007).

**Gender (Paper III)**

Gender was the main predictor in the third paper in two ways; respondent gender and vignette gender. The gender of the respondent was obtained from the survey questionnaire. The gender of the person that was featured in the survey vignettes (so-called vignette gender) was indicated with a typical male or female name (e.g., “Frank” and “Anne”) and the accompanying personal pronoun for the name. Both respondent gender and vignette gender were coded as male = 0 and female = 1.

**Covariates (Papers I–III)**

Both Papers I and II included several covariates to account for potential confounders. Since the two papers used samples derived from the same population study and examined types of sick leave as outcomes, several of the included covariates were identical or similar in both papers. Sociodemographic variables in both papers covered gender (male = 0; female = 1), age at the time of the (baseline) interview, employment income in 2007 (Paper I: in 100,000 NOK; Paper II: in 10,000 NOK) and level of education in 2007 (no university or college education = 0; university or college education = 1). This information was derived from administrative register records and linked to respondent data. Papers I and II also controlled for family situation by using a combination of register records and interview data to get information on whether the respondent was living with a partner (no = 0; yes = 1) and whether the respondent was living with younger children that demand a certain level of caregiving, which was operationalised as living with children below eleven years old (no = 0; yes = 1).

Two features of the respondent’s work situation were used as covariates in Paper I, namely type of occupation and job satisfaction. We had access to information about the respondent’s occupation that was provided in the interview and further classified in broad
occupational groups corresponding to the International Standard Classification of Occupations (ISCO-08) due to anonymity considerations. We used this information to categorise the occupation as either office-based/non-manual work (managers, professionals, technicians and associate professionals, clerical support workers; 0) and manual/physically demanding work (service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators and assemblers, elementary occupations; 1). Information about the respondent’s job satisfaction was obtained by combining data from five items in the telephone interview. The items were introduced by the phrase “To what extent do you experience in your work that …” and the items were as follows “…the management appreciates your work”, “colleagues ask for your advice”, “you have the opportunity to learn new things”, “you have self-determination in your job” and “you have monotonous work tasks”. Four response options were available: *to large extent* (1), *to some extent* (2), *to little extent* (3) and *not at all* (4). The latter negatively framed item was reversed, and the items were combined into a mean score of overall job satisfaction with a high score indicating a high level of job satisfaction. The scores were also standardised for the analysis. The scale had reliability estimates of $\omega_t = .65$ and $\alpha = .60$. These items do not constitute an established job satisfaction scale, but the items were copied or inspired by items in other studies where work is a central study domain (e.g., The Midlife in the United States study and The Norwegian Living Conditions Survey on Working Environment). Moreover, the items tap into many elements of the job’s nature and work environment that are considered central to job satisfaction such as task significance, skill variety, autonomy and feedback (e.g., Judge & Klinger, 2008). In Paper II, three characteristics of the respondent’s work situation were used as covariates. The variables comprised information from the interview at baseline on whether the respondent was employed in the private (0) or public sector (1), whether the work was part-time (below 37 working hours a week; 0) or full-time (1), and whether the work position involved coordinator or management responsibilities (no = 0; yes = 1).

Five variables on health-related factors served as potential confounders in Paper I. Two dichotomously scored items from the interview assessed the physical health and functioning of the respondent. The first item asked whether the respondent had any form of long-term disease, chronic health problem or permanent disability (no = 0; yes = 1), and the second item asked whether the respondent was limited in daily tasks due to ill health or disability (no = 0; yes = 1).
Mental health was measured in the self-completion questionnaire by the 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). This scale is a well-established instrument for assessing depression and has demonstrated high reliability and validity in survey and population studies (Cosco et al., 2017). The respondents rated each scale item based on how they felt or behaved during the past week. “I felt fearful” and “I was bothered by things that usually don’t bother me” are examples of two of the scale’s 20 items. The response options span from rarely or none of the time (1), some or a little of the time (2), occasionally or a moderate amount of time (3) to most or all of the time (4). The scale’s reliability estimates were good ($\omega_t = .89$ and $\alpha = .87$). Scale score were dichotomised to scores below 16 (0) and scores of 16 or greater (1), which is a commonly used dichotomy to indicate caseness of depression (Weissman et al., 1977). Two measures of substance use that were estimated through the self-completion questionnaire served as health-related lifestyle factors: daily cigarette smoking (no = 0; yes = 1), and whether the respondent had a high level of alcohol use, defined as a weekly alcohol consumption that exceeded 14 UK standard units of alcohol per week (112 grams of pure alcohol), according to the guidelines of the UK Department of Health (2016). In Paper II, both self-rated health and prior sick leave were included as covariates. One item in the baseline interview where the respondent was asked to rate his/her health for the moment as either excellent, very good, good, moderately good or poor was dichotomously scored as self-rated health (poor or moderately good health = 0; good, very good or excellent health = 1). Register-based sickness absence in 2006 was also coded into a dichotomous variable (no sick leave = 0; minimum one sick leave spell or more = 1) and added in the fully adjusted analyses.

Age at the time of the survey and a variable that comprised the proportion of women in the vignette occupations served as additional covariates in Paper III to test whether sick leave judgements varied according to age and according to the gender composition of the vignette occupation. Age was divided in three age groups (18–34, 35–60 and 61–83 years) and used as two dummy variables with the youngest age group as reference. The variable on the proportion of women in the vignette occupation covered the statistical proportion of women in all the 90 occupations represented in the vignettes. Of these occupations, the most female-dominated occupation was dental health secretary (proportion of women = 0.991), while scaffolder was the occupation with the lowest proportion of women (0.005) and telemarketer was the most gender-
balanced occupation (proportion of women = 0.496).

Statistical Analyses

Regression analyses were used in all three papers. Negative binomial regression models (Cameron & Trivedi, 2001) were used in Paper I. Papers II and III both used logistic regression analysis, and in Paper II linear regression analysis was additionally conducted for one of the outcomes. All initial data preparation and assumption checks, descriptive statistics, dropout analyses, scale construction and reliability diagnoses were performed in IBM SPSS Statistics versions 25 and 27, except for omega values (\(\omega_t\)) assessing the composite reliability of study scales in Paper I that were calculated in R, version 4.0.4., using the psych package (McNeish, 2018). The main analyses in Papers I and III were conducted with Stata Statistical Software release 15, version 1, while all analyses in Paper II were conducted with IBM SPSS Statistics version 27. The rest of this chapter provides a more in-depth account of the analyses performed in the three studies in this thesis, including moderator analyses and the use of survey weights, and discusses an alternative analytical method for Paper I.

Regression Analyses (Papers I–III)

In Paper I, negative binomial regression analysis was used to estimate the prospective association between personality dimensions and the continuous outcome variable (weeks of sickness absence). This type of model is an extension of the Poisson model and is commonly used to enable the analysis of overdispersed count outcomes by applying a quadratic variance function of the mean (Cameron & Trivedi, 2001). In the first out of three steps, personality dimensions were included one by one in unadjusted analyses. Secondly, all personality dimensions, age and gender were included simultaneously in the model. All predictor variables in the study were added in a third step including socioeconomic status (education, income), family factors (partner and children), health factors (long-term health problem, health limitations in daily tasks, depression) and work factors (type of occupation, job satisfaction) as covariates. We also controlled for previous sickness absence as a potential confounder in a final analysis by repeating the fully adjusted model on a sample were respondents that had sickness absence in the interview year were excluded. The results were reported in Incidence Rate Ratios (IRR).

An alternative model for analysing the data in Paper I was performed in the original draft of this study when it was first submitted for publication consideration. In that draft, we chose to divide sick leave into shorter periods and longer periods because Norwegian employers are
obliged to have a first “dialogue meeting” with the employee within seven weeks of sick leave to discuss and plan means to avoid unnecessary long-term sick leave. The employee is also obliged to participate in work-related activity if the health permits it (e.g., partial sick leave) by week eight (Hagelund, 2014). A cut-off after seven weeks of sick leave thus seemed expedient to distinguish between the duration of long-term sick leave since it is considered a critical timing for whether the employee continues long-term sick leave or returns to work. Consequently, the outcome measure was operationalised as a tripartite dependent variable on sickness absence (no sick leave [0], sick leave for 2–7 weeks [1] and sick leave for 8–52 weeks [2]). The stepwise analytical approach was the same as described in the previous section, but we used multinomial logistic regression analyses to examine the relationship between personality and sickness absence. “No sick leave” was set as the reference category in the analyses and was compared to the two sick leave categories.

Binary logistic regression analyses were conducted for the two binary outcome variables in Paper II, self-reported and register-based sickness absence. Separate analyses for each human value were conducted in a stepwise procedure to assess whether each human value represented a risk for sickness absence beyond common risk factors for sick leave. In a first step, the unadjusted bivariate association between the human value and sick leave was examined. Secondly, age and gender were introduced as covarying factors, and thirdly, the remaining covariates were additionally adjusted for (i.e., education, income, partner, children, work sector, working hours, working position, self-rated health), except for sick leave prior to baseline, which in addition was adjusted for in the fourth and final step. Furthermore, linear regression analysis was used to estimate the associations between human values and the continuous outcome variable (attitudes towards sickness absence) in Paper II. These analyses followed the same stepwise analysis procedure that was used for the logistic regression analyses in the same paper.

The outcome variable in Paper III had four categories on an ordinal scale (graded judgements of sickness absence vignettes). We tested whether the proportional odds assumption held (i.e., whether the impact of the explanatory variables is the same irrespective of the cut point between response categories on the outcome variable) to decide if ordinal logistic regression was the appropriate choice of analytical method. Consequently, three binary logistic regression analyses (one for each possible dichotomisation of the outcome variable) were performed with the approximate likelihood-ratio test of proportionality of odds across response categories. The
test rejected the null hypothesis that each of the coefficients was identical across the three sets of binary regressions ($\chi^2 = 18.56, \text{df} = 4, p = .001$), and we therefore proceeded with the analyses using the three sets of binary logistics regressions for the exhaustive possibilities for dichotomies of the outcome variable. In the analyses, the vignette judgements were treated as separate observations, but we applied cluster-robust standard errors to control for the nesting of vignettes within the individual (the six judgements from each respondent having correlated error terms; Cameron & Miller, 2011). We tested for gender differences in sick leave judgements and gender differences in social norms of sickness absence by regressing the judgements on respondent gender and vignette gender simultaneously. Age-stratified analyses were also performed by adding two dummy variables to contrast the two oldest age groups with the youngest age group in order to see whether judgements differed by age. To test whether sickness absence norms were different for female-dominated occupations compared to male-dominated and gender-balanced occupations, sick leave judgements were regressed on the variable with information about the proportion of women in the vignette occupation controlled for respondent gender and vignette gender.

**Moderator Analyses (Papers I and III)**

Moderator analyses were performed in both Papers I and III to examine whether the strength of the relationship between sick leave and personality dimensions, and between sick leave judgments and gender, respectively, varied according to different levels of potential moderators. In Paper I, health-related factors (long-term health problem, health limitations in daily tasks, depression, smoking, high alcohol intake), gender, age and work (type of occupation, job satisfaction) were analysed as potential moderators. Product terms for each of the five personality dimensions and moderators were calculated. A series of negative binomial regression analyses were performed to examine moderation where each product term was added to fully adjusted analyses (i.e., models that included all study variables). Significant moderation effects were further illustrated graphically by plotting predicted probabilities for levels of the moderating factor. Please note that these moderator analyses were not formally corrected for multiple comparisons, and that the effects should therefore be interpreted with caution. As mentioned earlier in this chapter, we have also carried out the analyses in Paper I applying a tripartite dependent outcome variable (no sick leave, shorter-term sick leave and longer-term sick leave) in the original draft of the paper. Apart from using multinomial logistic regression analyses, the
procedure for the moderator analyses in this alternative analytical approach was the same as in the final version of Paper I.

In Paper III, an interaction term of respondent gender and vignette gender was added to the three sets of binary logistic regression models for each of the possible three cut points of the outcome variable with respondent gender and vignette gender included in the models. Significant interaction effects would indicate that female and male respondents rated the vignettes differently based on the gender of the vignette person. Interaction analyses were also performed by age stratification to test whether female and male respondents in different age groups rated the vignettes differently and whether sick leave judgements in different age groups were different based on the gender of the vignette person. Product terms for both age groups indicators with respondent gender and with vignette gender were calculated and added to models where respondent gender, vignette gender and the two age group indicators were included as predictors in the three cut point specific regressions to test the null hypothesis that all gender coefficients were identical across age groups in each regression (i.e., that all coefficients for the product terms were jointly zero). To examine whether the association between sick leave judgements and the proportion of women in the vignette occupation was non-linear, a squared term of the proportion of women in the vignette occupation was added to the model with respondent gender, vignette gender and proportion of women in the vignette occupation as predictors in each of the three cut-point analyses. Significant quadratic effects would indicate a non-linear relationship between the proportion of women in the vignette occupation and sick leave judgements. Significant results were further presented by plotting probabilities for one of the cut-point analyses as a function of the proportion of women in the vignette occupation.

**Survey Weights (Paper I)**

The analyses in Paper I were conducted using survey weights provided by the NorLAG study to adjust for biased study participation. More specifically, the weights were calculated in order to adjust for the overrepresentation of individuals with higher education in the net sample and for some minor adjustments between the net sample and the population regarding gender, age and place of residence. The weights were calibrated so that the sum of weights for individuals that belonged to the same gender, age group, geographical region, municipal centrality and educational level equalled the number of individuals in the population that had these characteristics (see Bjørshol et al., 2010, for more details about study bias in NorLAG and the
calculation of survey weights). The weighted analyses were performed in Stata using the command for probability weight with single-stage design. We also carried out unweighted analyses to check the robustness of the results, which did not yield any substantial change in estimates and standard errors, and thus indicated that the results were robust.

Results

Paper I

In the first paper in this thesis, using negative binomial regression models, the analyses showed that extraversion was positively associated with subsequent sickness absence when controlling for several covariates, including health, work factors and previous spells of sickness absence. In the final model, the estimated rate of sickness absence weeks increased by 15% with every standard deviation increase in extraversion. Moreover, neuroticism showed significant positive associations with sickness absence also when controlling for most previous risk factors for sick leave; however, the association diminished when respondents with previous spells of sickness absence were excluded from the analysis. For the alternative analytical model used in the original draft of this paper, the results showed that even after controlling for covariates and excluding respondents with previous spells of sick leave, high levels of extraversion and agreeableness were prospectively related to a higher risk of longer-term sick leave (≥ 7 weeks; \( p < .001 \)), but not short-term sick leave (2–7 weeks). Neuroticism also was related to a higher risk of long-term sick leave in the adjusted model, but not in the final step when respondents with previous sick leave spells were excluded. Except for the association between agreeableness and sickness absence, the results are similar to those obtained in the final paper version, indicating robustness of results and that personality, namely extraversion, is related to longer-term sick leave beyond a direct function of health.

Moderator analyses, testing whether gender, age, health and work factors moderated the relationship between personality dimensions and sickness absence, further showed that two factors, age and type of occupation, acted as moderators for two personality-sickness absence associations. More specific, higher scores on openness were associated with an increased estimated rate of sickness absence weeks for the oldest part of the sample, while for the youngest part of the sample, high scores on openness were associated with a decreased rate of sickness absence weeks. The other analysis showed that for individuals working in manual occupations, higher scores on agreeableness corresponded to a decrease in the estimated rate of sickness
absence weeks, whereas higher scores on agreeableness tended to be related to an increase in the estimated rate of sickness absence weeks for individuals working in non-manual occupations. Interaction analyses performed in the alternative analytical model used in the original draft of this paper replicated one of the moderator effects found in the final version. In this analysis, type of occupation moderated the relationship between agreeableness and longer-term sick leave (> 7 weeks; \( p = .003 \)), which increases confidence in this result in the final paper version.

**Paper II**

The results in the second paper in this thesis showed that some types of human values were related to individual sick leave in situations that are associated with greater scope for assessing whether sick leave is necessary (i.e., attitudes towards sickness absence and shorter, presumably self-certified sickness absence). The analyses showed that out of Schwartz’ ten basic values, achievement was prospectively associated with higher levels of self-reported sick leave, even when controlling for a variety of covariates. Self-direction was also related to higher risk of self-reported sick leave in the adjusted analysis. Stimulation, a value that is conceptually linked to self-direction, was associated with lenient sick leave attitudes when controlling for covariates, while conservation values (security and conformity) were related to stricter attitudes towards sick leave in the adjusted analyses. Moreover, power, benevolence, security and conformity were bivariately correlated with register-based sickness absence, but none of the human values were prospectively associated with register-based sick leave in adjusted analyses. Self-transcendence values and hedonism were not related to either self- or register-reported sickness absence or attitudes towards sickness absence in adjusted analyses.

**Paper III**

In the third paper, sick leave judgements were regressed on respondent gender and vignette gender using binary logistic regressions across three cut points of judgements. The analyses showed that men and women rated the sick leave scenarios similarly, but that women had a 39% higher odds, compared with men, to rate a potential situation as being *perfectly unreasonable* for sick leave in one of the analyses compared to the other response alternatives (*fairly unreasonable, fairly reasonable* and *perfectly reasonable*). The analyses further showed no differences in sick leave judgements according to vignette gender. Thus, the results overall did not display substantial gender difference in either attitudes towards sickness absence or sickness absence norms. However, further analyses, examining sick leave judgements based on the
proportion of women that statistically occupy the occupation, showed a U-shaped association between favourable sick leave judgements and the proportion of women in the occupation. This result accordingly indicated that social norms of sickness absence are more tolerant for employees in gender-dominated occupations compared with employees in gender-balanced occupations. Age-stratified analyses did not show any age group differences in sickness absence judgements.

**Discussion**

**General Discussion of the Main Study Findings**

The overall research objective of this thesis was to provide novel information about key dispositional predictors of sickness absence and sickness absence attitudes. A further aim of this thesis was to examine whether gender differences in thresholds for sickness absence exist.

The main result of the first paper was that two of the five personality dimensions, extraversion and neuroticism, were positively associated with physician-certified sickness absence, but that only the association between extraversion and sickness absence was retained when previous spells of sickness absence were accounted for in the last analysis step. In Paper II, the key findings were that, controlled for a number of covariates, achievement and self-direction were related to an increased risk of self-reported sickness absence, and that conservation values and stimulation were associated with less tolerant and more tolerant attitudes towards sickness absence, respectively. However, no such associations were found between human values and physician-certified sickness absence in this paper. The main result of the third paper was that thresholds for sickness absence, either expressed as individual attitudes or social norms, are similar for men and women. A second important result from this paper was that the general attitudes towards sickness absence for employees in gender-dominated occupations were more tolerant than they were for employees in gender-balanced occupations. In continuation, this chapter will interpret and discuss the thesis’ main research findings in the context of the existing research literature, study strengths and potential threats to the validity of the findings.

**To What Extent Do Psychological Dispositions Play a Role in Sick Leave?**

Papers I and II in this thesis examined whether two types of psychological dispositions, personality and human values, were prospectively associated with the risk of sickness absence. Paper II further investigated whether human values also predicted attitudes towards sickness absence.
Register-based, physician-certified sickness absence was the outcome in Paper I and two personality dimensions, neuroticism and extraversion, were associated with increased risk of such absence. Consistent with the hypothesis and previous studies that found cross-sectional (Störmer & Fahr, 2013; Vlasveld et al., 2013) and longitudinal associations (Blekesaune, 2012; Raynik et al., 2020), neuroticism was associated with a greater risk of sick leave, even when controlled for health and other risk factors. Nevertheless, this significant association dissipated when respondents who had sick leave during the survey year were omitted, possibly indicating that confounding or reverse causal directionality is at play. In line with this possibility, previous studies have shown that negative life events, such as emergence of chronic disease, and subsequent mental distress and impaired quality of life can predict a sustained increase in neuroticism levels (Jeronimus et al., 2014; Jokela et al., 2014). It may be, for example, that neuroticism levels are increased temporarily, or more long-term, due to the potential physical, mental and social strains that longer or repeated episodes of sickness absence can entail, either directly due to the illness, but potentially also due to other aspects such as guilt over colleagues, feelings of suspicion and despair over not getting well.

Due to previously mixed findings, no initial hypothesis was made about the nature of the relationship between extraversion and sickness absence. The positive relationship between extraversion and sickness absence found in Paper I is consistent with previous studies on absenteeism (e.g., Furnham & Bramwell, 2006; Judge et al., 1997), but is not consistent with the other study on sickness absence that found a negative correlation with both short and long (> 2 weeks) absence spells (Vlasveld et al., 2013). A possible explanation for our positive association may be that due to aspects related to risk and excitement seeking, extraverts are more likely to have longer-term sickness absence, as this trait is related to substance use and accident liability in some studies (Booth-Kewley & Vickers, 1994; Clarke & Robertson, 2005; Terracciano et al., 2008). A competing or complementary explanation may also be that employees that are low in extraversion are less likely to approach sickness absence (i.e., display presenteeism) because traits such as being reserved, inhibited, having lower self-esteem and lower social skills (Ozer & Benet-Martínez, 2006; Robins et al., 2001) may make one refrain from going to the doctor and thus avoiding the discomfort and attention that the sick leave process may involve both in the doctor’s office and in the workplace. The conflicting result in Paper I with that of Vlasveld et al. (2013) can be related to methodological differences as this latter study used cross-sectional data.
and self-reported sickness absence which is more prone to respondent bias and is more limited by temporal confusion between the predictor and the outcome. Another difference between these two studies that may have implications for the results are that they relied on different frameworks of the Five-Factor Model of personality as Paper I was based on the Big Five Inventory and the study by Vlasveld et al. was based on the Neo Inventories.

As for the other personality dimensions in Paper I, contrary to the study hypothesis, the lack of a main effect was most surprising for the conscientiousness trait, since previous research has found a negative association with work absence (Sawyerr et al., 2009; Störmer & Fahr, 2013) and established that this trait is consistently linked to a number of health and work factors (e.g., Friedman et al., 2014; Wilmot & Ones, 2019). However, two other studies using longitudinal data on sickness absence did not find a relationship between sickness absence and conscientiousness (Blekesaune, 2012; Raynik et al., 2020) and are thus coherent with the result in Paper I. A possible interpretation of this null finding is that the protective effect of conscientiousness on absenteeism or sickness absence is primarily present for shorter absences where work motivation and dedication may have a greater bearing on the association with work absence. Conscientiousness has also been related to emotional exhaustion in some studies, which can potentially pull the association in the opposite direction in the sense that those who are high in this trait may be more vulnerable to longer-term sick leave due to some types of health problems such as burnout (Armon & Toker, 2013; Woods et al., 2013).

Based on previous empirical contributions, we predicted a negative association between agreeableness and sickness absence in Paper I, but we found no significant main effect for this trait. Nevertheless, the effect sizes of previous findings were small and based on cross-sectional data, while the other two previous studies, which, like our study, used longitudinal data, also did not find a significant relationship between these variables, thus increasing confidence in our null finding. However, a moderator effect was found for agreeableness, which may still suggest that this trait is related to sickness absence in more complicated ways with job characteristics. Type of occupation moderated the association between agreeableness and sickness absence, indicating that this trait may relate differently to sickness absence in manual occupations compared to non-manual occupations. One possible interpretation of the result is that individuals high in agreeableness are more reluctant to be on sick leave in manual occupations than in non-manual
occupations because the extra workload on colleagues in their absence may be a greater concern for these individuals who work in overall more physically demanding occupations.

We did not state an explicit hypothesis about the direction of the relationship between openness and sickness absence in Paper I, because only one identified previous study had linked openness to sickness absence and used cross-sectional data. Our null finding is consistent with what three other previously mentioned studies found based on longitudinal or cross-sectional data and supports the impression that this trait does not seem to have crucial significance for work absence in general. A moderator effect was, nevertheless, identified for this trait. The interaction between openness and age indicated that older individuals had higher risk of sickness absence whereas this association went in the opposite direction for younger individuals. A potential explanation for this interaction result is that openness may be beneficial for younger workers in adapting to new work tasks and work environments, which is typically more important early in the job career, while for older workers, high openness combined with extensive experience through a long job career can make the job seem monotonous and less rewarding and thus increase the risk of sickness absence.

Overall, the findings in Paper I show that two of the personality dimensions, neuroticism and extraversion, are positively associated with the risk of longer-term sickness absence, and that for extraversion, this association even holds when previous sickness absence history is taken into consideration. This latter finding thus suggests that extraversion appears to have functions that are important for sickness absence beyond the direct function of health aspects. Findings also showed that the relationship between personality and sickness absence may depend on more complex associations with age and type of occupation.

In Paper II, of the human values, achievement was related to a greater risk of self-reported sickness absence. This was contrary to our hypothesis because achievement is likely to manifest in personal ambition and give priority to hard work (Arieli et al., 2020) and has previously been associated with strong work commitment (Cohen, 2009), being career oriented (Arieli et al., 2020) and having lower risk of disability pension (Blekesaune, 2015). Yet, our finding is to some extent consistent with, for example, other studies that have found positive correlations between the achievement value and stress, anxiety, and alcohol consumption (Hanel & Wolfradt, 2016; Nordfjærn & Brunborg, 2015). Seen in the context of the lack of relationship between achievement and physician-certified sickness absence, however, a possible explanation for our
finding may be that individuals who are achievement-oriented may be inclined to take shorter absences from work to recover, and that they thus avoid longer absences which can also be more negative for career development.

Paper II further found that openness to change values were positively associated with lenient sick leave attitudes (stimulation) and self-reported sickness absence (self-direction), but were not related to register-based sickness absence. The finding for sickness absence attitudes is consistent with our hypothesis and it can also be argued that the finding for self-reported sickness absence, seen in light of the fact that we did not find a relationship between openness to change values and register-based sickness absence, also support the proposed hypothesis. This tendency for individuals who value openness to change to have a somewhat lower threshold for sickness absence in situations that may be less determined by the health situation and provide greater scope for assessing whether sickness absence is necessary (both in the form of attitudes and self-reported sickness absence), fits with their priority of independence of thought and action, and general readiness for change and unpredictability. At the same time, they may be less concerned about what others think about their absence because they do not seem to be particularly tied to their workplace (Cohen, 2009). We had no initial prediction for the relationship between openness to change values and actual sickness absence, since the self-direction value has been shown to have associations with health indicators that may suggest that these individuals overall are in good health (e.g., Beller, 2021; Sortheix & Schwartz, 2017). The null finding for the association with register-based sickness absence can thus potentially also be an expression of the generally good health of these individuals.

A third finding in Paper II, as hypothesised, was that two of the conservation values (conformity and security) were related to stricter sickness absence attitudes, which may be an expression of the inclination to prioritise moderation and follow rules also because one is concerned about certainty and stability in relation to colleagues and the workplace. Yet, conservation values, in disagreement with the hypothesis, were not related to either self- or register-reported sickness absence. That these values were related to sickness absence attitudes, but not to actual sickness absence when controlling for covariates can possibly be explained by the fact that such types of values, especially conformity, can to a greater extent be influenced by social norms (Bardi & Schwartz, 2003) and thus have weaker associations with behaviour such as sickness absence where normative pressures may be particularly relevant.
That self-transcendence values were not related to the threshold for sickness absence (i.e., neither attitudes to sickness absence nor actual sickness absence) in any of the analyses in Paper II was somewhat surprising. This type of human values was positively correlated with lenient attitudes to sickness absence in a previous study (Haugen et al., 2008). We thus hypothesised that such human values, which prioritise being understanding and concerned about the welfare of others, could be reflected in tolerant attitudes to sickness absence in potential situations that also partly centred on psychosocial work and family situations as causes of sickness absence, while it was more uncertain how such values would be related to own sickness absence. Consequently, the null findings in our study suggest that there are other factors that are more important for sickness absence and related attitudes than self-transcendence values.

The general conclusion of Paper II is that human values to a certain extent are related to sickness absence in situations where there is usually greater scope for individual assessment of whether sickness absence is necessary (i.e., attitudes to such absence and self-certified absence), but that other factors are more important when it comes to predicting longer physician-certified sickness absence.

To return to the question posed in the headline of this section; to what extent do psychological dispositions play a role in sick leave? Papers I and II in this thesis found that the psychological dispositions that were studied to a certain extent seem to play a role in sickness absence, also beyond the direct function of health, but that these associations are relatively modest. The most robust finding in this respect is perhaps that of Paper I, that showed that extraversion, based on survey data from a large population-based sample, was prospectively associated with register-based sickness absence, which also is in line with previous findings from absenteeism research. Moreover, in Paper II, two out of ten of the human values positively predicted self-reported sickness absence (achievement and self-direction), while stimulation, that has similar core values to self-direction also predicted more lenient attitudes towards sickness absence. In particular, these two latter corresponding findings for two related values provide some indication that there is something in these openness to change values that is important for sickness absence. That the two related human values, security and conformity, both predicted stricter attitudes to sickness absence also add more confidence in the findings. An interesting parallel between the findings in Papers I and II is that extraversion, and achievement, self-direction and stimulation values were associated with a higher risk of sickness absence, or with
more lenient attitudes to sickness absence as was the case for stimulation. These constructs have some theoretical overlaps and extraversion has been shown to be positively correlated with both achievement and openness to change values in several previous studies that examined the relationship between personality factors and human values (Fischer & Boer, 2015; Parks-Leduc et al., 2015; Roccas et al., 2002). This gives further confidence that there are some mechanisms related to precisely these constructs that are associated with the propensity for sickness absence. The further finding that none of the human values predicted register-based sickness absence indicates that it is mainly in situations where individual assessment is likely to be more prominent that human values may play a role in sickness absence. Nevertheless, to my knowledge, this is the first study that examines broad human values and sickness absence, and more research is therefore needed to understand the nature and extent of these associations.

Both broadly measured personality traits and human values have been shown to predict several types of work-specific attitudes and behaviours in previous studies (e.g., Arieli et al., 2020; Cohen, 2009; Soto, 2019), including absenteeism and sickness absence in some studies on personality (e.g., Raynik et al., 2020; Sawyerr et al., 2009; Vlasveld et al., 2013), and to a certain extent such broad factors also are associated with attitudes to sickness absence and actual sickness absence in the papers in this thesis. Taken as a whole, the findings in Paper I and II may also indicate that attitudes towards sickness absence and shorter self-reported sickness absence are closer to these broad dispositions than longer physician-certified sickness absence. Further research that combines the study of these broader dispositions with narrower personality traits and values that focus more directly on health and work behaviour can complement existing research and findings and may provide more detailed information that determines how important these dispositional factors are for sickness absence.

**Gendered Thresholds for Sickness Absence Legitimacy?**

As established in the introduction, women have higher sickness absence than men in many Western countries (Barmby et al., 2002; Mastekaasa & Melsom, 2014). In Norway, this gender gap is notably present in physician-certified sickness absence (Statistics Norway, 2019). Across the survey and register data used in the three papers, sickness absence was indeed more prevalent among women than among men. Gender thus constituted an important variable in all main analyses. However, in the third paper, gender was not only used as an important control variable or moderator, gender was the main predictor, because we wanted to test whether
gendered thresholds for what constitute legitimate sickness absence exist and thereby could be part of the explanation for the gender gap in sickness absence. The study focused on attitudes and norms for physician-certified sickness absence mainly based on health-related problems. The motivation behind this approach is that despite vast research attention, the gender difference in sickness absence still largely remains a mystery because previous research has been unable to establish clear explanatory factors and causal mechanisms for this gender difference (Mastekaasa, 2016), but many have pointed to sickness absence attitudes as part of the explanation without this having been empirically examined to any particular degree (Hellevik et al., 2019).

In terms of attitudes in Paper III, the difference in men’s and women’s attitudes to physician-certified sickness absence legitimacy was very small with only one of the analyses showing that women were less likely than men to rate sickness absence as completely unreasonable, whereas no gender differences were found for the other responses. The overall finding was thus that women and men did not differ substantially in the general level of leniency compared to restrictiveness in sickness absence attitudes. This finding is in line with two of the previous studies that have examined attitudes to sickness absence and that did not find gender differences in attitudes to physician-certified sickness absence in a sample of Norwegian managers (Mastekaasa et al., 2021) or gender differences in attitudes mainly addressed towards self-certified or illegitimate sickness absence in a sample of Norwegian public health service workers (Hauge & Ulvestad, 2017). However, a third Norwegian population-based study found that women were slightly more likely to accept both illegitimate sickness absence and sickness absence due to situations that were more in the grey area or strictly outside what the sickness absence regulations allow (Hellevik et al., 2019). Apart from the item “feeling tired or exhausted”, the items in this latter study centred around psychosocial and social issues related to work or family situation (e.g., difficulties in connection with marital breakdown; great pressure or stress at work; caring for or nursing a close family member). The findings of the Hellevik et al. study (2019) are thus not in line with the findings in Paper III and the two previously mentioned studies on sickness absence attitudes that showed no gender difference. Nevertheless, the data in Paper II in this thesis also showed that women overall had more tolerant attitudes to sickness absence than men, but the 8-item attitude index employed in the paper was largely modelled on the battery of attitude items used in Hellevik et al. (2019), which mostly dealt with potential
reasons for shorter-term, or strictly illegitimate, sickness absence and covered few direct health-related reasons.

These varied findings related to gender differences in sickness absence attitudes may be an expression of differences in study design, perhaps especially with regard to the attitude measures used: when presented with specific health problems, women and men seem to assess the legitimacy of sickness absence in a similar manner, but when mainly social problems are stated reasons for absence, women seem to be somewhat more accepting of sickness absence than men. Although such social problems are not legitimate reasons for sickness absence according to the sickness absence regulations, the findings may indicate that women can be slightly more understanding of sick leave in these situations that are less objective and not directly health-related, possibly because they reflect situations that women to a greater extent than men can recognise as problematic because they are more often in these situations themselves. Still, gender differences in sickness absence are primarily present in physician-certified sickness absence and Paper III specifically measured attitudes towards physician-certified sickness absence over a large number of possible scenarios and applied a study design that is considered less vulnerable to respondent bias than more traditional survey questions and items, which previous studies have largely relied on. Based on the findings in Paper III, we therefore do not consider it likely that gender differences in attitudes to sickness absence are an essential explanation for the gender difference in physician-certified sickness absence.

Regarding sickness absence norms (i.e., how the environment evaluates sickness absence) the results in Paper III indicated that there seem to be no different social norms related to the legitimacy of women’s and men’s sickness absence. This finding also persisted when examining the acceptance of sickness absence according to the statistical gender distribution of employees in different occupations, since we found that sickness absence norms were more tolerant for both female-dominated and male-dominated occupations compared with gender-balanced occupations. More lenient norms for sickness absence in gender-dominated occupations can be an expression of the type of job tasks that people generally assign to such occupations (i.e., heavier manual tasks, less flexibility and autonomy), which they may see as more challenging to perform when having health problems than typical gender-balanced occupations (e.g., office jobs, managerial positions) and thus more compatible with sickness absence. These findings substantiate those of two previous studies on this topic that also did not find gendered norms of what constitute
legitimate work absence in a sample of Canadian managers and information technology professionals (Patton, 2011) or what constitute legitimate sickness absence in a sample of managers in Norway (Mastekaasa et al., 2021), whereas Patton and Johns (2007) found greater societal acceptance of women’s work absence than men’s absence. The conflicting finding may be due to methodological differences as the Patton and Johns’ study analysed general attitudes and ideas in the media, based solely on one newspaper only, but since the study covered a long time span and the majority of articles were from before the 1990s, temporal differences may also have played a role in the different results. The study further examined absenteeism, and not sickness absence per se, largely over a historical period with fewer women in the labour market and where household and childcare responsibilities were generally more unevenly distributed between men and women than today. Such issues may have strengthened the legitimacy of women’s absenteeism in the Patton and Johns’ study.

Other dispositional factors that have been associated with sickness absence in some studies are attitudes to sickness absence, which are closer to the behaviour we want to explain than broad personality traits and human values, but, as visited in the Introduction, also on this topic there are relatively few studies that have addressed this association directly and that have examined differences in such attitudes between groups (Hauge & Ulvestad, 2017). Nevertheless, the findings from the few previous studies and especially from Paper III, all in all, provide limited support for the existence of widespread and systematic gender differences in attitudes to sickness absence. It thus seems unlikely that sickness absence attitudes among men and women and general attitudes at the societal level are important explanatory factors for the observed gender difference in sickness absence. However, the previous research literature on attitudes (and norms) as a potential explanation for gender differences in sickness absence is scarce, both in terms of studies of employees, but also studies of these attitudes among key stakeholders such as general practitioners (who certify the majority of medical certificates), employers and managers. Consequently, additional research is needed before firm conclusions can be drawn (Mastekaasa et al., 2021). Despite this, there are most likely other factors, or sets of factors, that have a greater significance for the gender difference in sickness absence. A previous article that reviews possible explanations and studies conducted to elucidate the gender difference in sickness absence provides limited support for the most commonly used hypotheses to explain the gender gap and refers to studies that indicate that gender differences in health and illness behaviour seem
to develop early in life. Such studies substantiate explanations that gender differences in sickness absence can to a significant extent be a result of biological factors, or of gender differences in the socialisation of children, which are related to differences in health and illness behaviour between the genders even before they start their work and family careers, but further research is needed to identify more precise possible causal mechanisms for these explanations (Mastekaasa, 2016).

Altogether, regarding explanatory factors for sickness absence, it boils down to the fact that there are a large number of factors at the societal, organisational and individual level that can contribute to the complex course of sickness absence. Beyond health situation as an important factor, it is therefore not probable to find a small number of precise explanatory factors for variations in this behaviour. In terms of dispositional psychological factors, previous findings and the findings in this thesis suggest that personality and human values may play a smaller role in sickness absence at the individual level, but more research is needed to further determine the role of these factors and elucidate explanatory mechanisms for the identified associations.

Strengths, Limitations and Other Methodological Considerations

The study findings presented in this thesis must be understood in the light of important strengths and limitations. There are three types of threat to the validity of the included studies, construct validity, internal validity and external validity, which will be discussed below.

Construct Validity

A strength of the papers in this thesis is that many comprehensive, well-established and widely applied psychometric survey instruments and scales were used, which gives confidence that these instruments capture the content of the construct they were intended to measure, and may also facilitate the comparison of findings across studies.

Discussing study measures more specifically, the use of vignettes and an experimental design to measure attitudes in Paper III have several strengths. Factorial survey methods have been used to study judgement and decision principles in diverse topics such as fairness of earnings and a wide range of social policy issues (e.g., appropriate sentences for criminals), and is considered a resource effective method to gain a large set of judgements (see e.g., Auspurg & Hinz, 2015). However, the vignette survey with experiment has been relatively rarely used for the type of study purpose that we had in Paper III (Patton, 2011) and can therefore be considered an innovative procedure for measuring gender differences in sickness absence attitudes and norms. The advantage of this design is that the participant is forced to evaluate all dimensions of the
hypothetical scenarios simultaneously, which is more similar to real-life assessment situations (Auspurg & Hinz, 2015). The indirect questioning is also more subtle than standard item-questions and thus less prone to social desirability bias (Alexander & Becker, 1978; Auspurg & Hinz, 2015).

The attitude index for sickness absence attitudes used in Paper II covered a number of potential issues that can lead to sickness absence and thus also constitutes a detailed measure of sickness absence attitudes. Some of these presented issues concerned situations that in the strict medical sense do not qualify for neither self-certified nor physician-certified sick leave in the Norwegian system (social aspects related to family or work situation). A strength of this index is thus that it also measures such types of hypothetical situations, which may contain more individual doubt and assessment of whether sick leave is justified, and may thereby leave more room for values to come into play than questions on strictly health related issues. This aspect can also make these described situations more similar to situations that the individual may encounter in everyday life and therefore strengthen the credibility of the measure. Still, this index is also limited in the sense that it has not been tried out and tested in many previous studies and is considered more prone to response bias than attitudes measured through vignette scenarios.

Moreover, since self-reported data on sickness absence is a common denominator for most of the previous research that have examined psychological dispositions as predictors of sickness absence, another major strength of this thesis is the combination of survey data with register-based data on sickness absence in Papers I and II. Such register data are less prone to underreporting and other self-reporting bias and are thus considered to be highly reliable and preferred over self-reported sickness absence (Thorsen et al., 2018). However, there are a few limitations to these register data on sickness absence that need mentioning. First, the register records only provided information on the accumulated number of sickness absence weeks for each calendar year, and it was thus not possible to distinguish between one long-term and several shorter-term spells of sickness absence within each year. Second, the register records covered physician-certified sickness absence spells that lasted more than 16 calendar days and the data thereby did not provide information on shorter periods of sickness absence in the employer-covered period. Third, it was also not possible to distinguish between partial and full-time sickness absence in the available register data on sickness absence, nor in the self-reported data on sickness absence.
The predictor measures in Papers I and II also had some limitations. Regarding the personality measure used in Paper I, with only four items assessing each of the five personality dimensions, the potential in predicting sickness absence might have been restricted by the limited breadth of coverage of each dimension. This possible limitation also applies to the basic values scale, that was the predictor in Paper II, where two items measured the central goal of each human value. Both personality dimensions and human values have been linked to several types of work-related outcomes in previous studies (e.g., Arieli et al., 2020; Ozer & Benet-Martínez, 2006). Nevertheless, since relatively few associations between these predictors and sickness absence were found in the two papers, bandwidth-fidelity issues may also be a potential part of the explanation. That is, that personality dimensions and human values may be too broad and distal to be able to accurately predict the rather specific behaviour of sickness absence. From that perspective, it may be that examining basic values combined with more work or health-related values could yield greater explanatory power on sickness absence. In terms of personality, previous studies show that personality dimensions seem to explain similar amounts of variance in work-related behaviour as specific personality facets, even for absenteeism (Judge et al., 1997; Woods et al., 2013). Still, having access to a more comprehensive personality instrument, and thus the opportunity to break down associations at the facet level, would be beneficial in order to gain a greater understanding of the mechanisms that underlie the relationships at the broader trait level. We additionally performed single-item personality analyses in Paper I to confirm that associations with sickness absence at the item level went in the same direction as the broader trait, which they did, but the items were not sufficient to test proposed mechanisms for the findings.

A final matter of construct validity relates to the somewhat low reliability estimates for two of the instruments in Papers I and II. In Paper I, the alpha values for the items measuring two of the personality dimensions, conscientiousness and agreeableness, were in the lower range. In Paper II, the coefficient alphas for some of the basic values of the HVS were also quite low, especially for tradition, self-direction and power. These issues may have limited the representativeness of these constructs.

**Internal Validity**

The three study papers in the thesis also had strengths that supports the internal validity of the results. Previously referred studies that examined the dispositional basis of sickness absence...
has also, for the most part, been cross-sectional. Accordingly, a major strength of Papers I and II is the prospective study design and use of longitudinal data on sickness absence, which provides more information about the temporal relationship between the predictors and sickness absence than previous studies, although causal inference cannot be concluded. In Paper II, longitudinal survey data were also used, but since the time interval between the two rounds of data collection was quite long (2007, 2017), it may have affected the results. It is possible that ten years between data points may be too long to establish connections between events (Veenstra et al., 2021). However, this limitation might be less important for the findings in this paper, because the main predictors, human values, are considered basic and trans-situational personal orientations that are relatively stable across time (Milfont et al., 2016), while the link to register data for the years between the study rounds also helps to compensate for long time span between data collections (Veenstra et al., 2021).

Although Papers I and II are based on data from a large population-based study, another aspect that may limit internal validity in these papers is the possibility of systematic attrition and non-response related to the study outcomes. This can be a particular threat of bias related to the study results in longitudinal contexts (Banks et al., 2011), and is thus most relevant for Paper II, which is entirely based on a longitudinal sample. However, since non-response and attrition are also threats to the representativeness of the study sample, these matters will be discussed more in detail together in the next section about external validity.

In Paper III, the experimental variation of vignette factors across the vignettes and across respondents are strong points for the internal validity of the study design, and largely preclude that order effects of the vignettes could have influenced the results. The large number of vignettes as the analytical unit also strengthens internal validity. The strong study design consequently adds confidence in the study’s findings that there are in fact no marked gender differences in attitudes towards sickness absence, which is also consistent with the findings in some previous studies (Hauge & Ulvestad, 2017; Mastekaasa et al., 2021). It must nevertheless be mentioned that it is possible that few differences in attitudes judgements between men and women also may be due to methodological issues that reduced the generalisability of the respondents’ judgements to real life. One possibility is that since the scenario describes a situation that concerns a third party, and not the respondent himself/herself, this may lead to a different assessment than in an actual situation where the choice may have a real consequence in the respondent’s life. Regarding
the lack of gendered norms, one consideration is that the name of the vignette person and use of personal pronouns might not have been sufficient to elicit gender bias or such biases could have been weakened or neutralised by the more detailed descriptions of health problems in the vignettes. Still, we do not consider it very likely that such methodological issues have significantly affected the study results.

**External Validity**

The use of fairly large, population-based study samples is also a strength of all the papers in this thesis, but some issues related to the representativeness of the samples compared with the population needs to be addressed. Papers I and II were based on cross-sectional and longitudinal data from the Norwegian Life-Course, Ageing and Generation Study (NorLAG). In longitudinal studies, initial non-response is of concern for the representativeness, especially for national samples (Song et al., 2021). Moreover, subsequent attrition of respondents between study waves, which can be particularly demanding for longitudinal studies of aging populations, further is a concern for potential bias due to respondents systematically dropping out. Non-random attrition related to study outcomes threatens representativeness compared to the population, especially in a longitudinal context (Banks et al., 2011). Initial participation in longitudinal studies and the risk of dropping out in subsequent rounds of data collection have been shown to be correlated with a number of factors in previous research. Women, married individuals and those with higher education have a consistently higher likelihood of both participation and retention in studies, whereas attrition tend to be higher among the oldest and youngest part of the population, minorities and those with poor health (see e.g., Song et al., 2021).

Initial oversampling of the oldest participants in NorLAG was performed to limit attrition due to old age in subsequent rounds of data collection (Slagsvold et al., 2012). In Paper II, two rounds of survey data were used in the analysis (NorLAG round 2 and 3), and response rates in both rounds were good (61% and 68%, respectively). The patterns of non-response and attrition in previous longitudinal studies, as described above, largely correspond with those of the NorLAG study. The general tendency was that study retention was related to respondents in good self-rated health and with higher education in all three rounds of NorLAG, whereas attrition due to mortality at follow-up from the first round was higher among the older part of the sample, men, those with lower education and poorer self-rated health. Similar characteristics of attrition at follow-up between round two and three were found (see Veenstra et al., 2021 for more details).
Paper I used cross-sectional data from the second round of NorLAG, which was expanded from being a study of the middle-aged and older population in the first round to include a representative sample of the adult Norwegian population aged 18–79 years. The initial response rate was considered good (60%). In this round, as described earlier, non-response in the interview and follow-up questionnaire was primarily associated with educational level, which led to an underrepresentation of those with basic education, and the tendency that the youngest age groups, men and individuals with basic education were less likely to return the questionnaire. Representativeness due to attrition was less of a concern for the sample used in Paper I, than the sample used in Paper II, because the majority of the study sample in Paper I were first-time participants in the NorLAG study.

Since poor health and lower education are generally positively linked to sickness absence, it is not unlikely that underrepresentation of individuals with these factors could have led to a lower level of sickness absence among the respondents in the NorLAG study samples in Papers I and II compared to the population. Yet the higher levels of sickness absence among women in general and the overrepresentation of women in the samples may also have affected the overall incidence of sickness absence in the samples. However, it is not obvious that these issues of representativeness have affected the relationships between personality and human values, respectively, with sickness absence found in the two papers. Furthermore, comparison of the analyses in Paper I with and without the use of survey weights did not show substantial changes in the results thus indicating that the study findings were not affected by sample bias.

In Paper III, the use of a self-selected sample may have limited the generalisability of the study findings to the Norwegian society. The invitation to participate in the vignette study was sent to a probability sample from a web-panel consisting of self-selected individuals that were willing to respond to one to two surveys a month. The research market firm that runs the panel invites potential participants on the basis that the panel should continuously strive to be as representative as possible of the Norwegian population. Employment was a prerequisite for participating in the vignette study and the sample was stratified by gender, but the selection procedure was nevertheless not compatible with resulting in a probability sample of the Norwegian employee population. It is therefore a possibility that individuals who voluntarily self-select to participate in survey research on a regular basis systematically stand out with regard to gendered attitudes to sickness absence, or other relevant factors for the study. Still, there is no
evident reason why this study sample should represent more or less gender-biased attitudes to sickness absence than the average Norwegian employee and thus be an important source of error that weakens the generalisability of the findings to the Norwegian society.

The context of the papers in this thesis could also limit the generalisability of the study findings to other study samples and to other countries. First of all, the Norwegian context may have an impact on how personality, human values and gender are related to sickness absence and attitudes towards sickness absence. The COVID-19 pandemic set aside, since the data used in this thesis are dated from before this pandemic, the labour market in Norway has historically been characterised by high employment levels, although this has declined somewhat in recent years, relatively low unemployment and high levels of sickness absence with an overrepresentation of women. Employment is also high among women (OECD, 2019), and the focus on shared division of household and childcare tasks between the genders is pronounced (Kitterød & Lappegård, 2012). In addition, the Norwegian sick-pay scheme is largely trust-based and is considered financially generous compared with many other states. These aspects potentially make the Norwegian context particularly interesting for studying factors for sickness absence that are less driven by economic motives than in countries where wage penalties are greater (Dale-Olsen, 2018). However, these contextual conditions may also make the study findings in all three papers less generalisable to other national contexts, especially those that have less generous sick-pay schemes and where gender equality and labour force participation among women are not as high.

Furthermore, there may be temporal aspects that limit the generalisability of the findings in this thesis. The data collection in Paper III, for example, was conducted in the wake of a time were there had been a lot of focus on the gender difference in sickness absence in the media discourse and the public debate in Norway (e.g., Hellevik et al., 2019). Such attention to the fact that women are overrepresented in sickness absence statistics and speculation that the societal acceptance of women’s sickness absence is greater than men’s may thus have affected how the respondents judged the sickness absence scenarios in the study. One possibility is that raised awareness about women’s higher sickness absence may have led to a perception that women’s sickness absence is excessive and thus to less acceptance of women’s sickness absence in the study compared with if the study had been done a few years earlier. Changes in the regulations and practices related to the sickness absence scheme in the time before, around and after the data collections in the NorLAG study may also have had an impact on the findings in Papers I and II.
The sickness absence regulations were, for instance, reformed in 2004 with increased demands for activity requirements and use of graded sick leave, and in 2011, with a new professional guideline for sick leave certification and an earlier deadline for holding the first dialogue meeting between employer and employee (Nossen, 2014). These changes may have had consequences for thresholds both in terms of seeking and certifying sickness absence, and accordingly it may also have affected the associations between the predictors and sickness absence or attitudes towards sickness absence in these papers.

**Study Implications and Directions for Future Research**

The findings in the papers in this thesis yield implications and directions for future studies. First, they highlight that personality traits are prospectively associated with sickness absence, which further develop existing research on this topic since the few previous studies largely have been cross-sectional and based on shorter, self-reported absenteeism or sickness absence as these data are usually more readily accessible and are thought to be more strongly related to such individual factors. The findings in Paper I identify neuroticism and extraversion as risk factors for longer-term, physician-certified sickness absence inferred from register data. However, the causal directionality between neuroticism and sick leave should be further investigated in future studies. Direction for future research also involves testing possible explanatory mechanisms for the positive relationship between extraversion and sickness absence, which may be enabled by using a more comprehensive personality scale. Future studies may further increase the understanding of the role of personality and the risk of longer-term sickness absence by examining interactions between personality dimensions and by more closely investigating interactions between personality and type of work in particular.

Paper II rendered knew knowledge that human values to some extent do seem to be related to shorter self-reported sickness absence (i.e., achievement, self-direction), yet they did not have an association with longer-term, physician-certified sickness absence. Stimulation and conservation values also were related to sickness absence attitudes. However, previous studies on the role of human values and sickness absence or attitudes towards sickness absence are lacking. Accordingly, additional studies are essential to establish these relationships. Moreover, the validity of the HVS has been debated, particularly with regard to discriminant validity between some of the human values, and revised short forms of both the HVS and the original PVQ have been developed (e.g., Sandy et al., 2016). This further calls for future studies to broaden the
understanding of human values as predictors of sickness absence by using more comprehensive or improved brief human values scales. Another implication from the study findings in Paper II for future research may be to investigate whether health- or work-oriented values may yield greater explanatory power on sickness absence than broad human values, and whether such narrower values also can be predictive of longer, physician-certified sickness absence. Furthermore, with access to cause-specific data on sickness absence (e.g., whether sickness absence was certified on the basis of mental or somatic diagnostic health categories) future studies may provide more insight into the association between extraversion and sickness absence (Paper I) and whether any of the human values potentially can predict longer-term sickness absence for some types of health problems (Paper II).

The findings in the third paper in this thesis also provide several implications and directions for future research. With regard to attitudes and norms for sickness absence, a conceptual implication for future research that has emerged from the findings in Paper III is that it largely refutes the claim that gender differences in such attitudes and norms seem to exist at the overall level and thus that they are not likely to be of substantial importance for the gender difference in sickness absence. This implication therefore contradicts popular myths and speculations about the gender difference in sickness absence, at least in Norway, and may contribute to pushing the research front forward in this field. At the same time, it is a possibility that gendered sickness absence judgements vary depending on the person or situation, also in potential scenarios for physician-certified sickness absence mainly due to health problems, that we studied, but that this was not revealed because we did not have the possibility to go into type of situation or person other than distinguishing by gender. The research literature on attitudes and norms as potential influences on the gender difference in sickness absence among employees is also very limited and studies about their possible influence in crucial groups and stakeholders, such as general practitioners and managers, are even more limited. Accordingly, more studies are needed on this topic before firm conclusions can be drawn. Hence, directions for future research include conducting more vignette studies on this topic in other samples and countries, perhaps especially outside of Scandinavia, and that different operationalisations of vignettes are also tested with respect to the degree of details of the vignette person and its situation (Mastekaasa et al., 2021). Another proposal for future research is to experimentally test for gender differences in
sickness absence attitudes in cases where the respondents are put in real choice situations with potential consequences for themselves.

Managers and other stakeholders who monitor sickness absence in the workplace may have potential gains from the findings that human values are associated with strict and lenient thresholds for sickness absence. Taking into account individual differences in human value orientations among frequently absent employees can, for example, help to understand the reason for frequent, shorter absences and support individual adaption in the workplace. In a similar vein, the finding that extraversion increased the risk of longer term, physician-certified sickness absence may constitute practice-relevant information for workplace facilitation, return to work programs and occupational health-promoting work. Such knowledge may help identifying employees at risk for longer term absences and adjusting the direction and intensity of interventions (Vlasveld et al., 2013). If successful, these efforts may also reduce the incidence of permanent exclusion from working life. Furthermore, findings indicating that attitudes and norms are not very likely to be important motivations of the gender difference in sickness absence may also be of informative value for policy and intervention work. Such a confutation can additionally lead to potentially less stigma in society about women as employees, because the study does not support that women in general have a more relaxed perspective on physician-certified sick leave compared to men.

Conclusions

This thesis has studied several related psychological dispositions and their contribution to variations in sickness absence and attitudes to sickness absence. The findings of the thesis highlight that individual-level factors such as personality and human values should also be considered contributors in the complex course of sickness absence. Overall, this thesis has increased existing knowledge about personality as predictor of sickness absence by showing that mainly extraversion is also related to longer-term, physician-certified sickness absence spells seemingly beyond the direct function of health, whereas the causal relationship between neuroticism and such absence spells needs closer attention in future research. How the association between personality and sickness absence may unfold in different types of occupations is also interesting to investigate further in prospective studies. Moreover, the thesis has provided new knowledge by showing that human values seem to have a bearing on sick leave, at least in the form of attitudes to sickness absence and self-reported sickness absence, but
not for longer-term, physician-certified sickness absence. More specifically, conservation values predicted stricter sickness absence attitudes and stimulation was associated with more lenient attitudes. Achievement and self-direction, where the latter value shares motivational goals with stimulation, posed increased risks of self-reported, mostly self-certified sickness absence. The conclusion is thus that human values mainly seem to apply to sickness absence in situations where individual assessments of the absence’s legitimacy are more likely to play a greater role. Another important conclusion in this thesis is that the findings provide little support for the popular claim that attitudes and social norms for sickness absence, by extension, are important driving mechanisms behind the observed gender gap in sickness absence. The limited understanding of the gender difference in sickness absence can potentially have a negative impact on gender equality in the workplace and employment processes, and contribute to a weaker career and salary development for women compared to men. Although we did not find mechanisms that can substantially explain this gender gap, the results from the study suggest that it is not work commitment or work centrality that is decisive for why women have higher sickness absence than men, and that society in general does not seem to favour women’s sickness absence. In this respect, the findings may also be informative for policy and intervention work that focus on reducing sickness absence levels.
References


https://doi.org/10.14301/llcs.v2i2.115

https://doi.org/10.1177/0146167203254602


https://doi.org/10.2307/3440797

https://doi.org/10.1080/08870446.2020.1761976


https://doi.org/10.5271/sjweh.3562


https://www.ssb.no/a/publikasjoner/pdf/notat_201019/notat_201019.pdf


# Errataliste

Navn kandidat: Gørl Kvaamme Løset

Avhandlingstitel: Sickness Absence and the Role of Personality, Human Values and Attitudes: Experimental and Longitudinal Studies

Forkortelser for type rettelser:

Cor – korrektur

Celtf – endring av sidelayout eller tekstformat

<table>
<thead>
<tr>
<th>Side</th>
<th>Linje</th>
<th>Fotnote</th>
<th>Originaltekst</th>
<th>Type rettlese</th>
<th>Korrigert tekst</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>11</td>
<td></td>
<td>… the Norwegian Study on Life-Course, Ageing and Generation …</td>
<td>Cor</td>
<td>… the Norwegian Life-Course, Ageing and Generation Study …</td>
</tr>
<tr>
<td>IV</td>
<td>6</td>
<td></td>
<td>… Covariates/Confounders …</td>
<td>Cor</td>
<td>… Covariates …</td>
</tr>
<tr>
<td>IV</td>
<td>9</td>
<td></td>
<td>… Moderator/Interaction Analyses …</td>
<td>Cor</td>
<td>… Moderator Analyses …</td>
</tr>
<tr>
<td>V</td>
<td>20</td>
<td></td>
<td>… longitudinal register-data …</td>
<td>Cor</td>
<td>… longitudinal register data …</td>
</tr>
<tr>
<td>VI</td>
<td>24</td>
<td></td>
<td>… gender-balance occupations …</td>
<td>Cor</td>
<td>… gender-balanced occupations ..</td>
</tr>
<tr>
<td>4</td>
<td>28</td>
<td></td>
<td>… resumption is also …</td>
<td>Cor</td>
<td>… resumption are also …</td>
</tr>
<tr>
<td>5</td>
<td>27</td>
<td></td>
<td>… characteristics, but …</td>
<td>Cor</td>
<td>… characteristics but …</td>
</tr>
<tr>
<td>7</td>
<td>22</td>
<td></td>
<td>… absence Alexanderson, …</td>
<td>Cor</td>
<td>… absence; Alexanderson, …</td>
</tr>
<tr>
<td>8</td>
<td>21</td>
<td></td>
<td>… and working-environment …</td>
<td>Cor</td>
<td>… and work environment …</td>
</tr>
<tr>
<td>10</td>
<td>16</td>
<td></td>
<td>Rhenen et al. …</td>
<td>Cor</td>
<td>Van Rhenen et al. …</td>
</tr>
<tr>
<td></td>
<td></td>
<td>… Steers and Rhodes’ …</td>
<td>Cor</td>
<td>… Steers and Rhodes …</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>------------------------</td>
<td>-----</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>5</td>
<td>… characteristics notably, …</td>
<td>Cor</td>
<td>… characteristics, notably …</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>6</td>
<td>… rural areas …</td>
<td>Cor</td>
<td>… rural areas, …</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>26</td>
<td>(Henderson, 2011)</td>
<td>Cor</td>
<td>(Henderson et al., 2011)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>30</td>
<td>… (conservation) was …</td>
<td>Cor</td>
<td>… (conservation) were …</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>12</td>
<td>… of other …</td>
<td>Cor</td>
<td>… of others …</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>17</td>
<td>(Statistics Norway)</td>
<td>Cor</td>
<td>(Statistics Norway, 2019)</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>14</td>
<td>… related to …</td>
<td>Cor</td>
<td>… attributed to …</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>31</td>
<td>… longitudinal register-data …</td>
<td>Cor</td>
<td>… longitudinal register data …</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>3</td>
<td>… longitudinal register-data …</td>
<td>Cor</td>
<td>… longitudinal register data …</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>20</td>
<td>… in European.</td>
<td>Cor</td>
<td>… in Europe.</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>6</td>
<td>… and 30–39 underrepresented …</td>
<td>Cor</td>
<td>… and 30–39 years underrepresented …</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>29</td>
<td>… assigned a …</td>
<td>Cor</td>
<td>… assigned to a …</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>16</td>
<td>… register-data …</td>
<td>Cor</td>
<td>… register data …</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>9</td>
<td>… and score of …</td>
<td>Cor</td>
<td>… and scores of …</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>1</td>
<td>… weighted analysed …</td>
<td>Cor</td>
<td>… weighted analyses …</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>8</td>
<td>… values are …</td>
<td>Cor</td>
<td>… values were …</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>24</td>
<td>(Booth-Kewley, 1994 …</td>
<td>Cor</td>
<td>Booth-Kewley &amp; Vickers, 1994…</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>26</td>
<td>… was not related …</td>
<td>Cor</td>
<td>… were not related …</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>13</td>
<td>… is primarily …</td>
<td>Cor</td>
<td>… are primarily …</td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>24</td>
<td>… III has several …</td>
<td>Cor</td>
<td>… III have several …</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>13</td>
<td>… and is thought …</td>
<td>Cor</td>
<td>… and are thought …</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>25</td>
<td>Self-direction and …</td>
<td>Cor</td>
<td>Stimulation and …</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>7</td>
<td>… V. R. R. Jr. …</td>
<td>Cor</td>
<td>… Vickers, R. R. Jr. …</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>14</td>
<td><a href="https://doi.org/10.1136/oemed-2014-102143">https://doi.org/10.1136/oemed-2014-102143</a></td>
<td>Cor</td>
<td><a href="https://doi.org/10.1136/oemed-2013-101891">https://doi.org/10.1136/oemed-2013-101891</a></td>
<td></td>
</tr>
<tr>
<td>156</td>
<td></td>
<td>… with longitudinal data …</td>
<td>Cor</td>
<td>… with longitudinal register data …</td>
<td></td>
</tr>
</tbody>
</table>
Papers I–III
Big five personality traits and physician-certified sickness absence

Gøril Kvamme Løset1 and Tilmann von Soest2

Abstract
Although several studies show that personality traits are associated with absenteeism, few large-scale studies have examined these relationships prospectively, integrating survey data and register data on sickness absence. This study examines whether personality is associated with sickness absence, and whether health factors, gender, age, type of occupation and job satisfaction moderate this relationship. We combine survey data assessing the Big Five personality traits from a large sample of Norwegian employees aged 18–62 years (N = 5017) with register data on physician-certified sickness absence up to four years after. Negative binomial regression analyses showed that extraversion was positively associated with subsequent sickness absence when controlling for several covariates, including health, work factors and previous spells of sickness absence. Neuroticism also showed significant positive associations with sick leave; however, the association diminished when accounting for previous spells of sickness absence. Moderator analyses demonstrated that age and type of occupation affected some of the associations between personality and sickness absence. The findings indicate that — in addition to general health promotion measures — specific interventions targeting individuals high in extraversion may be beneficial in reducing sick leave. How socio-demographic and work-related factors moderate the relationship between personality and sickness absence may be an interesting future research area.

Keywords
sickness absence, sick leave, personality, health, occupation

Big Five personality traits and physician-certified sickness absence
Sickness absence is considered a substantial burden in public expenditure and productivity loss. In European countries, per capita public expenditure on sick leave is comparable to public costs for unemployment benefits and the share of sick leave expenditure on overall social protection expenditure is with 9.8% particularly high in Norway, where the present study is conducted (Schei-Adlung & Sandner, 2010). Although sickness absence is intended to be a health-promoting and work-inclusive measure, it is also associated with costs for the individual in terms of reduced income and career prospects, and being a gateway to permanent work disability (Markussen, 2012; Salonen et al., 2018). Moreover, sickness absence varies with gender, age and socio-economic status (Markussen et al., 2011; Mastekaasa & Melsom, 2014). Some of this variation is explained by social patterns in health, morbidity and work conditions (Løve et al., 2013; Markussen et al., 2011). Still, several studies suggest that a substantial part of the variation arises from individual factors that may predispose employees to sickness absence (Henderson et al., 2009; Markussen et al., 2011).

In the present study, we use a combination of large-scale survey data and longitudinal register data on physician-certified sickness absence to examine to what extent personality is associated with sickness absence in a sample of Norwegian employees aged 18–62 years (N = 5017). Furthermore, we investigate whether these associations vary by health status, gender, age, type of occupation and job satisfaction.

Theoretical considerations and previous research
‘Sickness absence’ is often conflated with the broader term ‘absenteeism’ in the literature. In this paper, absenteeism refers to all failures to report for scheduled work (Johns, 2002), while sickness absence, or ‘sick leave’, strictly covers absences from contracted work on the grounds of either self- or physician-certified health issues.

Individual-focused models highlight sickness absence as an expression of strain related to job and family situations, health problems and motivations to attend work that may ‘push’ or ‘pull’ the employee into sickness absence (see Allebeck & Mastekaasa, 2004a). For example, Steers and Rhodes’ process model (1978) considers most sickness absence episodes as a combination of the ability and motivation to attend work where the ability is primarily impaired...
by illness or injury, while the motivation depends on job satisfaction and incentives or pressures related to economic, social or psychosocial factors. Empirical data indicate that motivational factors and pressures indeed are of importance. For example, large-scale Norwegian studies show that recovery rates from sickness absence rise substantially just prior to the exhaustion of sickness insurance benefits, thereby indicating that motivational factors and not health status alone determine sickness absence (Markussen et al., 2011).

Similarly, other process models consider sickness absence as a process in key stages, each with a complex set of factors with individual perceptions, beliefs and other psychosocial influences contributing to the progress. Stage progression, in the form of increasing occupational incapacity due to sickness symptoms, rests on the decision to remain at work despite symptoms or the decision that short-term sick leave and in other cases medically and culturally endorsed long-term sick leave is necessary (Henderson et al., 2011). Balance models of employee well-being additionally assume that the balance between job demands and job resources is important for the development of strain and motivation and their link to employee outcomes such as sick leave. Personal resources, including personality factors, may be particularly relevant for understanding individual variations in perceived job stress and may contribute to whether job requirements and job resources lead to health deterioration processes (see Demerouti & Bakker, 2011). Both process and balance models thus consider individual difference variables as important factors in the complex course of sickness absence (Henderson et al., 2011), and personality as such can be important in explaining variations in sick leave decisions even when accounting for differences in somatic and mental health.

Personality is related to a broad array of important life outcomes, such as subjective well-being, intimate relationships, education and financial security (Ozer & Benet-Martínez, 2006; Soto, 2019). Personality has also been shown to be related to labour market outcomes including job attainment, occupational satisfaction and commitment (Ozer & Benet-Martínez, 2006; Soto, 2019). Sick leave may therefore be one of the mechanisms that link personality to poor outcomes in the labour market and there is a growing recognition that dispositional factors can predict work absence (Henderson et al., 2009; Judge et al., 1997; Störmer & Fahr, 2013).

The present study examines associations between physician-certified sick leave and the widely used Big Five personality dimensions. Broad personality dimensions are considered to be of substantial relevance for exposure, appraisal and coping with work stress and its health outcomes (see Grant & Langan-Fox, 2006). Empirical studies also show that personality traits are linked to overall health, self-perceived health, and behaviour that may protect or harm health (Korotkov & Hannah, 2004; Ozer & Benet-Martínez, 2006; Strickhouser et al., 2017). Consequently, one would expect personality to be related to sickness absence. However, previous research on the association between personality and sick leave is sparse because studies have mostly concentrated on the association of a single trait, or a few personality traits, with absenteeism, while the relationship between sickness absence and more standardised frameworks for personality, such as the Big Five personality model, has received limited attention (Judge et al., 1997; Vlasveld et al., 2013). Longitudinal studies on the association of the Big Five personality dimensions and sick leave are particularly sparse, although these studies would provide valuable indications of a potential causal relationship between personality and sickness absence. Such information is especially valuable in this area of research because some studies indicate that onset of health problems, particularly chronic disease, is associated with lasting personality change in adulthood (Jokela et al., 2014). We therefore need more knowledge about whether personality traits indeed are prospectively related to later sickness absence, or whether reverse causal associations may be an alternative explanation.

**The association between Big Five personality traits and sickness absence**

A few previous studies have examined the association between Big Five personality dimensions and sickness absence (Raynik et al., 2020; Störmer & Fahr, 2013; Vlasveld et al., 2013), with only one of them covering register-based sick leave (Blekesaune, 2012). Two of these studies used data from a nationally representative German survey that included a 15-item version of the Big Five Inventory (BFI). The first study used cross-sectional data to examine sickness absence incidence and duration (absences up to 30 days; Störmer & Fahr, 2013), and the second study used longitudinal data to examine sickness absence rates (Raynik et al., 2020). A third Dutch study applied cross-sectional survey data to test the association between personality as measured by the 60-item NEO-Five Factor Inventory and short-term (0–2 weeks) and long-term (>2 weeks up to 6 months) sickness absence in a non-representative sample of individuals with psychopathology and healthy controls (Vlasveld et al., 2013). A final Norwegian study comprised cross-sectional survey data from a sample of middle-aged employees combined with register-based data on sickness absence. Blekesaune (2012) examined the association between personality assessed by a 20-item version of the BFI and physician-certified sickness absence rates after the survey. We will elaborate on the findings of these studies trait by trait below. Note that, our following predictions about how personality is related to sickness absence were not pre-registered.

The personality trait of neuroticism, defined as the disposition to experience negative emotions such as anxiety, sadness, irritability and nervousness (Benet-Martínez & John, 1998), may be of particular importance for sickness absence. One may expect an association between neuroticism and sickness absence because high neuroticism is related to poorer physical and mental health and functioning, and poorer stress-coping strategies (Goodwin & Friedman, 2006; Strickhouser et al., 2017), which may increase the risk for sickness absence. Also, high neuroticism is associated with negative health behaviour such as smoking, alcohol and substance use (Malouff et al., 2007; Terracciano et al., 2008). Patterns could also be driven by elevated symptom perception as neurotic individuals tend to worry more about their health (Vollrath et al., 1999),
over-report symptoms (Feldman et al., 1999) and see physicians more often (Korotkov & Hannah, 2004). A previous study found rather large positive effects of neuroticism on short- and long-term sickness absence in healthy workers (e.g., OR: 2.15 [1.31–3.52], p = .002 for long-term sick leave; Vlasveld et al., 2013). Similar results were found in other studies with large to medium sized associations between neuroticism and sickness absence (Blekesaune, 2012; Raynik et al., 2020; Störmer & Fahr, 2013). We therefore hypothesise that neuroticism is related to higher risk of sickness absence.

Extraverts are characterised as active and energetic, dominant, friendly and outgoing, expressive and experiencing positive emotions (Benet-Martinez & John, 1998). Extraversion entails aspects that lead to conflicting predictions regarding sick leave. On the one hand, this trait has been linked to engagement in health-promoting behaviours (e.g., exercise and healthy diet) and good self-perceived health (Booth-Kewley et al., 1994; Goodwin & Engstrom, 2002). On this basis, one would predict that extraverts might be less absent from work than others. On the other hand, extraversion and sub-facets such as excitement seeking are positively associated with substance use and risk-taking in some studies (Booth-Kewley et al., 1994; Terracciano et al., 2008). The link to risky health behaviours could suggest that extraversion positively predicts sickness absence. Indeed, most studies find that extraversion positively predicts absenteeism (Judge et al., 1997; Darviri & Woods, 2006; Furnham & Bramwell, 2006). However, in one of the studies focusing on sickness absence, extraversion has been negatively related to sickness absence with small sized effects, possibly because extraverts are more likely to cope with work stressors by expressing their concerns than by avoidance coping in the form of sickness absence (Vlasveld et al., 2013). The other identified studies on personality and sickness absence did not find any association with extraversion (Blekesaune, 2012; Raynik et al., 2020; Störmer & Fahr, 2013). Given the mixed findings in the field, it is somewhat unclear how extraversion and sickness absence are related.

Conscientious individuals are described as being organised, thorough, self-disciplined and reliable, and cherish obligations to others, which promotes task- and goal-directed behaviour (Benet-Martinez & John, 1998). Possibly due to their disciplined nature, conscientious individuals tend to report less risk-taking behaviour (Vollrath et al., 1999), less drug and alcohol use (Malouff et al., 2007; Terracciano et al., 2008) and more positive health behaviours than others (Armon & Toker, 2013; Kern & Friedman, 2011). Also, conscientiousness is linked to better self-perceived health and a lower likelihood of developing physical and mental illness (Goodwin & Engstrom, 2002; Goodwin & Friedman, 2006). In line with these notions, several studies have shown that conscientiousness is negatively related to absenteeism (Judge et al., 1997; Sawyerr et al., 2009), and medium effect sizes related to reduced sickness absence incidence (Störmer & Fahr, 2013), and reduced risk of short- and long-term sickness absence (Vlasveld et al., 2013). Although two studies did not find a correlation between conscientiousness and sickness absence (Blekesaune, 2012; Raynik et al., 2020), we nevertheless hypothesise that conscientiousness is negatively associated with sickness absence.

Agreeableness refers to being prosocially oriented by, for instance, displaying altruism, cooperativeness, tolerance, trust and modesty (Benet-Martinez & John, 1998). This trait can lead to good social relationships and the positive health effects thereof, but can also compromise health if efforts to harmonise with the surroundings consistently lead to self-sacrifice (Kern & Friedman, 2011). In earlier studies, agreeableness has been associated with positive health behaviour and good self-reported health, low alcohol involvement and low risk-taking behaviour (Booth-Kewley et al., 1994; Goodwin & Engstrom, 2002; Malouff et al., 2007; Terracciano et al., 2008). In line with this research, two studies show that agreeableness is related to less risk of sickness absence in general (Störmer & Fahr, 2013) and less risk of short-term sickness absence (Vlasveld et al., 2013). However, the effect sizes were small, and two other studies did not establish this association (Blekesaune, 2012; Raynik et al., 2020). Still, on this basis, we hypothesise that agreeableness is negatively related to the risk of sick leave.

Openness describes the breadth and complexity of the individual’s mental and experiential capability and is associated with being creative and unconventional (Benet-Martinez & John, 1998; Terracciano et al., 2008). Individuals high in openness have reported higher likelihood of negative and risky health behaviour such as drinking, smoking, driving under the influence and illegal drug use (Booth-Kewley et al., 1994; Terracciano et al., 2008). These associations could translate into an increased risk of sickness absence not only from a direct effect on health but possibly also indirectly through negatively affecting job commitment. Still, some studies report that individuals high in openness tend to have a positive health perception (Goodwin & Engstrom, 2002) and that openness is protective to all-cause mortality (Ferguson & Bibby, 2012). We identified only one study that showed a significant association between openness and sickness absence. Vlasveld et al. (2013) found that openness negatively predicted long sickness absence spells (>2 weeks; medium effect size), but not short spells. The other studies that have examined personality dimensions and sick leave did not find an association with openness (Blekesaune, 2012; Raynik et al., 2020; Störmer & Fahr, 2013). Due to the sparse research on openness, it remains uncertain how openness and sickness absence are related.

In the present study, we additionally control for several factors that are linked to sickness absence. Health is considered a main driver of sickness absence because illness and morbidity are typically requirements for sickness absence and is shown to predict sick leave, particularly spells lasting longer than a week (Ferrie et al., 2009; Marmot et al., 1995). We therefore account for mental and somatic health problems. We also control for cigarette smoking and alcohol consumption because such risk health behaviours are associated with sickness absence (Allebeck Mastekaasa, 2004b; Devaux & Sassi, 2015).

We include gender because women are consistently overrepresented in sickness absence. For example, pooled
data over a 10-year period from 17 European countries show that sickness absence among women was on average 30% higher than among men (Mastekaasa & Melsom, 2014). Such gender difference in sickness absence can only to some degree be explained by higher rates of mental and somatic health problems among women than men (Laaksonen et al., 2008; Mastekaasa, 2016), whereas other factors such as work-related psychosocial factors (e.g., emotional work and effort-payment imbalance) have also been shown to have some significance (Sterud, 2014). We also control for age due to the positive association with particularly long-term sickness absence. Likewise, we include socio-economic status (education, income) that is negatively correlated with sickness absence (Allebeck & Mastekaasa, 2004b; Markussen et al., 2011). Because we know that the work and family situations may be important influences in sickness absence, we additionally include measures on this. We take type of occupation and job satisfaction into consideration because work tasks associated with manual work and a poor psychosocial work environment seem to entail increased risk of sickness absence (Kok et al., 2017; Laaksonen et al., 2010; Sterud, 2014). Although findings are somewhat inconsistent, we also control for having a partner and younger care-dependent children because it has been shown to correlate with sickness absence in some studies (Allebeck & Mastekaasa, 2004b; Mastekaasa, 2013). Besides, the previously identified study on personality dimensions and register-based sickness absence did not consider work and family factors (Blekesaune, 2012).

**Factors that may moderate the personality-sickness absence association**

A further aim of this study is to examine whether associations between personality and sickness absence are moderated by health, key socio-demographics and work-related factors. Somatic and mental health measures, substance use, gender, age, type of occupation and job satisfaction cover such factors in our study.

Health is related to sick leave and the strength of personality associations with sick leave may depend on the individual’s health status. More specifically, the association between personality and sick leave may be weaker for employees that have physical or mental health problems because adverse health conditions may lead to sick leave for most employees, largely independent of their personality dispositions.

Concerning key socio-demographics, it is widely established that women generally have higher rates of sickness absence than men do. One mechanism that has been proposed to explain the gender gap in sickness absence is that women and men differ in illness behaviour (Mastekaasa, 2016), and women are to a greater degree than men aware of their health and seek medical attention more often (Oksuzyan et al., 2008). Women also score higher on neuroticism, which is associated with health worries (Schmitt et al., 2008). The relationship between neuroticism and sickness absence may thus differ for men and women. Two studies examining this issue have provided mixed findings, where one study showed that neuroticism predicted higher rates of sickness absence in women, but not in men (Blekesaune, 2012), whereas the other study found that neuroticism only positively predicted sickness absence duration in men (Störmer & Fahr, 2013). The few and conflicting findings call for more studies to examine potential complex associations between gender and personality in sickness absence.

Regarding age, while there has been extensive research on its relation to sickness absence (Markussen et al., 2011), there is less research on age as a moderator of sickness absence predictors. It is possible, for example, that high neuroticism has a stronger positive association to sickness absence for younger workers because they generally have less work experience and routine than older workers and may therefore be more likely to seek sickness absence when symptoms of ill health arise, or novel job tasks are overwhelming. Another possibility is that different generations of workers are subject to different norms for when sickness absence is acceptable (Markussen et al., 2011), which in turn could yield a stronger negative effect of high conscientiousness on sickness absence in younger generations that may have a more lenient threshold for when sickness absence is necessary. It is also possible that personality dimensions generally have greater latitude in younger workers’ assessments of whether sick leave is needed than in older workers because they overall have less severe health problems that clearly require sickness absence. Accordingly, we hypothesise that the relationship between personality and sickness absence depend on employee age.

Heavy manual occupations are suggested to be a risk factor for sickness absence (Laaksonen et al., 2010), but whether personality predicts sickness absence differently depending on type of occupation has hardly been explored. One study found that extraversion was positively correlated with length of sickness absence among technicians, whereas for service workers, extraversion was negatively and openness was positively associated with absence duration (Störmer & Fahr, 2013). In this study, we hypothesise that personality might have a weaker association with sickness absence for workers in physically demanding occupations compared to office-based occupations because physically demanding occupations typically involve work tasks that are less feasible with the presence of health problems and thereby provide less individual evaluation of whether sick leave is needed.

Job satisfaction and support is associated with lower likelihood of long-term sickness absence (Kok et al., 2017; Laaksonen et al., 2010), but whether such work circumstances affect the impact of personality on sickness absence has been less addressed. The association between, for example, neuroticism and sickness absence might be stronger when job satisfaction is low because those high in neuroticism may be more heavily influenced by discontent in the job, thereby leading to sickness absence, whereas those low in neuroticism may cope more robustly with a poor psychosocial work environment. Similarly, when job satisfaction is high, those both high and low in conscientiousness may be more likely to attend work, but when job satisfaction is low, high conscientiousness may have a stronger negative relationship with sickness absence. Thus,
we hypothesise that job satisfaction might moderate the relationship between personality and sickness absence.

The present study
To sum up, research on personality dimensions predicting sickness absence is limited and results are mixed, but the few existing studies seem to agree that personality is an under-researched and promising field for studying the dispositional basis of work absence. However, with one exception, previous studies have relied on self-reported sickness absence, which is prone to underreporting (Thorsen et al., 2018). There is also a dearth of studies testing the assumption that personality can predict absenteeism over time spans greater than a year (Harrison & Martocchio, 1998). The present study therefore adds to previous research by examining the prospective association between personality and sickness absence over a four-year period. Using register-based, physician-certified sickness absence, the present study is also one of the first to test whether personality dimensions predict longer absences that are gatekept by the physician and thus considered more closely tied to health issues than self-certified absence.

Based on previous work, we hypothesise that neuroticism is associated with a higher risk of sickness absence, and that conscientiousness and agreeableness are associated with a lower risk. For extraversion and openness, due to mixed and sparse findings, we did not state any hypothesis concerning the association to sickness absence. We further hypothesise that the associations between personality and sickness absence is moderated by the employee’s health, age and gender, and depend on the type of occupation and job satisfaction of the employee.

Methods
Study procedure and participants
We used cross-sectional data from the second wave of The Norwegian Life-Course, Ageing and Generation study (NorLAG2; NorLAG, 2014). NorLAG2 is a large-scale survey comprising a nationally representative sample of respondents aged 18–79 (N = 14,884). In collaboration with Norwegian Social Research, Statistics Norway performed the data collection in 2007 from computer-assisted telephone interviews, self-completion questionnaires and administrative registers. Informed consent was obtained for both participation in the study and the link to register data. The NorLAG study was approved by the Data Protection Officer for Research at Statistics Norway and the Norwegian Centre for Research Data.

The initial telephone interview had a response rate of 60%, and 73% of the interviewees completed the subsequent questionnaire (overall response rate of 44%). Non-response bias for the telephone interview was generally small, but non-response was somewhat higher among the youngest age group (18–29 years) and among persons with lower degree of education. Moreover, of those who were interviewed, young age, being male and low education were related to a somewhat higher risk of not completing the questionnaire. The net sample for the self-completion questionnaire thus showed that women were overrepresented by four percentage points, while the two youngest age groups were somewhat underrepresented (18–29 years by 4.6 percentage points and 30–39 years by 1.4 percentage points) and those with lower degree of education were underrepresented by just above eight percentage points (see Bjørshol et al., 2010 and Slagsvold et al., 2012 for more study details and response rates in NorLAG).

The requirements for receiving sickness benefit in Norway include being less than 70 years of age, being unable to work due to functional impairment from sickness or injury, having worked continuously for a minimum of four weeks, and earning at least half of the yearly public pension base rate of the National Insurance Scheme (1x the average public pension base rate amounted to 65,505 NOK in 2007). Sickness benefit is maximally received for one continuous year, and a one year sickness benefit period may enable disability pension. For workers aged 67–69 years, however, sickness benefit requirements and maximal length differ from those of younger workers. Consequently, workers who were 67 years or older in 2011 (the last year with data on sickness absence), who retired with a disability pension, old-age pension or early retirement pension within 2011, were omitted from the study sample. Self-employed respondents were also removed because they generally have less generous sickness benefit schemes than other workers.

To further ensure a sample that represented workers that were entitled to sickness benefit, we set three selection criteria: (1) gainful employment during the interview, (2) normally working at least 15 hours per week, and (3) an annual salary a minimum 50% of the public pension base rate in the interview year and the four-year study period after the interview (2007–2011). Finally, the sample was restricted to those who had completed the questionnaire where personality was measured. The present study sample thus comprised 5017 respondents between 18–62 years at the time of the interview.

Measures
Sickness absence. Data on sickness absence were derived from Statistics Norway’s Historical-Event Database and linked to the survey data. The data provide information on whether and for how long the employees received sickness benefit for physician-certified sickness absence through the Norwegian Labour and Welfare Administration (NAV). The employer normally covers the employee’s sick pay for the first 16 calendar days, while NAV covers sickness benefit from the 17th day of sick leave. Hence, we do not have records concerning shorter sick leaves <17 days that are physician- or self-certified and are thereby not able to identify such shorter spells. Sickness absence length was recorded as the sum of sickness benefit days within each year for the years 2007–2011, coded as number of work-weeks with sickness benefit (1 week = 5 working days). For analysis purposes, we calculated sick leave as the sum of absence weeks over the four years after the interview as the outcome variable (2008–2011; M: 8.72; SD: 16.95; Min: 0; Max: 121).
Personality. Personality was measured by a 20-item Norwegian short version of the Big Five Inventory (BFI; John & Srivastava, 1999). Both the original BFI and the short version have shown favourable psychometric properties and good reliability (Engvik & Føllesdal, 2005; John & Srivastava, 1999). The BFI has also demonstrated good cross-cultural validity and convergent validity with other well-known five-factor measures (Engvik & Føllesdal, 2005; John & Srivastava, 1999).

Four items each measured the five personality dimensions. We used McDonald’s Omega Total (ωt) to assess reliability, because this measure is recommended to be used instead of Cronbach’s alpha for unidimensional scales when tau equivalence is not assumed (McNeish, 2018). Reliability estimates were: openness (ωt = .70), conscientiousness (ωt = .64), extraversion (ωt = .85), agreeableness (ωt = .67) and neuroticism (ωt = .73). The items consist of short characteristics that are rated on a seven-point scale from fits poorly (1) to fits well (7) based on how these descriptions apply to the typical state of the respondent. Mean scores for each personality trait were computed. Although some of the values of the composite reliability are modest, they resemble those obtained with other short measures of broad personality traits (Lang et al., 2011). The BFI items were originally not constructed to measure personality on the facet level. Yet, to illustrate content heterogeneity, the four items measuring conscientiousness, the trait with the lowest reliability, have been shown to cover diverse aspects of conscientiousness related to facets of Order (tends to be disorganised; can be somewhat careless) and Self-discipline (makes plans and follows through with them) according to the BFI facet scales that were developed later (Soto & John, 2009). A full overview of the BFI-20 scale items used in this study is available as online supplementary material S1 at https://osf.io/5823a/.

Health-related factors. We controlled for several health aspects that are likely to explain a substantial part of sickness absence. Two items measured physical health and functioning by phone interview. The first item assessed whether the respondent has any long-term disease, chronic health problem or permanent disability. The second item assessed whether the respondent is limited in daily tasks due to ill health or disability. Both items scored dichotomously with 0 = no and 1 = yes.

We measured mental health using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The scale consists of 20 questionnaire items that the respondents rated based on how they felt or behaved during the past week (e.g., ‘I was bothered by things that usually don’t bother me’, ‘I felt that everything I did was an effort’). Response categories ranged from rarely or none of the time (1), some or a little of the time (2), occasionally or a moderate amount of time (3) to most or all of the time (4). The scale demonstrated good reliability (ωt = .89) and was dichotomised to scores below 16 (0) and scores of 16 or higher (1), which indicates being at risk for clinical depression (Weissman et al., 1977). The CES-D scale is commonly used to quantify depression and the scale’s high reliability and validity is documented in numerous survey and population studies (Cosco et al., 2017). Note that, the scale contains some items that overlap with items of the neuroticism trait and this is also reflected in the correlation between the two (r = .38). Notably, depression items such as ‘I felt sad’, ‘I felt like I could not shake off the blues…’, ‘I felt depressed’ and ‘I felt fearful’ were similar to neuroticism traits of ‘feeling depressed, blue’, ‘worries a lot’ and ‘gets nervous easily’.

The time aspect and concept of the two scales are nevertheless different since CES-D measured symptoms the last week, while personality aimed to capture the typical state of the respondent.

We also assessed substance use through two measures: whether the respondent smoked cigarettes on a daily basis (no = 0; yes = 1) and whether the respondent had a risky level of alcohol consumption defined as a weekly alcohol intake that exceeded the recommendation of the UK Department of Health (2016) to consume a maximum of 14 standard units of alcohol per week (no = 0; yes = 1).

Occupational type. Data on occupation were derived from the telephone interview and were classified in broad occupational groups according to the International Standard Classification of Occupations (ISCO-08). Based on this information, we divided the respondents in two occupational categories. The first category, coded ‘0’, comprised individuals with typically office-based and non-manual jobs (managers, professionals, technicians and associate professionals, clerical support workers). The second category, coded ‘1’, consisted of occupations that are considered to involve manual and physically demanding job tasks (service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trades workers, plant and machine operators and assemblers, elementary occupations).

Job satisfaction. Five items from the telephone interview assessed job satisfaction. These items were inspired by other large surveys where work has been an important study domain, such as the Midlife in the United States study and the Norwegian Living Conditions Survey on Working Environment. The items were introduced by the sentence, ‘To what extent do you experience in your work that …’, with the following items: ‘the management appreciates your work’, ‘colleagues ask for your advice’, ‘you have the opportunity to learn new things’, ‘you have self-determination in your job’ and ‘you have monotonous work tasks’. The four response categories ranged from to large extent (1), to some extent (2), to little extent (3), to not at all (4). We combined the items into a mean score of overall job satisfaction so that a high score indicated high job satisfaction. The scale had a reliability of ωt = .65.

Socio-demographic data. Socio-demographic variables included respondents’ age at the time of the interview, gender (male = 0; female = 1) and employment income in the interview year in 100,000 Norwegian kroner (NOK; about 10,000 USD). Additionally, respondents’ level of education in the interview year was classified as basic education (0), comprising completed upper secondary school or lower, and as higher education (1), which included university or
college education of minimum one year. Having care-dependent children was operationalised as having children below 11 years of age in the household (no = 0; yes = 1), while living with a partner at the time of the interview also was dichotomously scored (no = 0; yes = 1).

Statistical analyses
A series of negative binomial regression analyses using Stata v15.1 (StataCorp, 2017) were performed to examine the prospective association between personality and sickness absence weeks. This type of analysis is particularly suitable for count data. We apply the most common variant, the negative binomial 2, which uses a quadratic variance function of the mean (see Cameron & Trivedi, 2001 for more details).

In a first step, personality dimensions were included one by one as predictors of sickness absence in univariate models. In a second step, all personality dimensions, age and gender were included simultaneously as predictors to assess the relative importance of personality to sick leave. In a third step, all predictor variables were added simultaneously, including personality, health factors, occupational type, job satisfaction and socio-demographics (full model). To examine the potentially confounding effect of prior sick leave spells, the full model analysis was rerun in a sample where respondents who had sick leave in the interview year were excluded. Lastly, interaction terms were computed between personality traits and the potential moderators (age, gender, health and work factors) and included one by one in series of full regression models (i.e., models that comprised all study variables).

We reported incidence rate ratios (IRR) as measures of association, 95% confidence intervals for IRR and p-values with a significance level that was set to \( p < .01 \). IRR provide information about the relative rate of sickness absence weeks by comparing the estimated rate of sickness absence weeks at one level of the predictor variable with the estimated incidence rate when the predictor has increased by one unit. All continuous predictor variables were standardised for the analyses; IRR for continuous predictors can therefore be interpreted as the ratio of estimated incidence rates for one standard deviation change in the predictor variable.

Sample weights provided by the NorLAG study were used as probability weight for single-stage design in Stata to adjust estimates and standard errors for the biased survey participation (see Bjørshol et al., 2010 for more information about survey weight calculation in NorLAG). As fit indices for negative binomial regression models cannot be estimated when adjusting for survey weights, we reported model fit for analyses without adjustments. All analyses were also conducted without survey weights to check the robustness of the results. The data code and analysis script for the analyses are openly accessible as online supplementary material S3 at https://osf.io/5823a/.

Results
Descriptive statistics
The final sample consisted of 5017 gainfully employed respondents with an average age of 41.8 years (SD = 10.3), and 54.7% were women (\( n = 2746 \)). In all, 47.1% had college or university education and 75.8% were living with a partner. Furthermore, 43.9% (\( n = 2200 \)) of the sample had at least one physician-certified sickness absence spell (>16 days) in the 4 years following the interview.

Table 1 provides descriptive statistics for the total study sample and for those with and those without sick leave during the study period. Concerning personality, particularly neuroticism showed elevated levels among the group that had sick leave. Moreover, also agreeableness and extraversion scores were somewhat higher among this group compared to those who did not have sick leave. Somatic and mental health problems were more prevalent in the group that had sick leave. Daily smoking was related to a higher risk for sick leave, whereas high levels of alcohol consumption were slightly less prevalent among individuals with sick leave compared to those who did not have sick leave. Regarding socio-demographics, being a woman, low income, no higher education and working in manual occupations were related to more sickness absence. Finally, job satisfaction was lower among those with sickness absence.

Bivariate correlations showed small to moderate correlations within Big Five personality traits, except for between openness and conscientiousness (\( p > .01 \)), and with age, gender and job satisfaction. Neuroticism was positively correlated with all health status variables, whereas openness was positively correlated with risky alcohol use, but did not correlate with any of the health status variables (see online supplementary material S2 at https://osf.io/5823a/).

The prospective associations between personality traits and sickness absence
Our outcome of sick leave weeks indicated overdispersion as the mean of the outcome for the sample (8.72) was considerably smaller than the variance (287.46). Moreover, likelihood-ratio tests for all models confirmed that the dispersion parameter alpha significantly differed from 0, suggesting that a negative binomial model was preferable to a Poisson model for the count data (i.e., number of weeks of sick leave) used in this study.

In a first set of analyses, univariate models were run to examine the association between each personality trait and sick leave separately (see first half of Table 2). The results showed that with one standard deviation increase in neuroticism the expected rate of sickness absence weeks increased by 26% (IRR: 1.26, 95% CI: 1.19–1.34, \( p < .001 \)). The other four remaining personality traits, extraversion, openness, agreeableness and conscientiousness, were not predictive of sick leave in these unadjusted models (\( p > .01 \)).

Second, we regressed sickness absence on all personality dimensions along with age and gender simultaneously. The results (see second half of Table 2) showed that the previously reported association with neuroticism held in this analysis. We further noticed that extraversion showed a tendency of being positively related to sick leave with an IRR of 1.10; however, this association was not statistically significant (IRR: 1.10, 95% CI: 1.02–1.19, \( p = .015 \)).
Table 1. Descriptive statistics for respondents with and without sick leave and for the total study sample.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sick leave 2008–2011 (n = 2200)</th>
<th>No sick leave (n = 2817)</th>
<th>Total sample (N = 5017)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD) n (%)</td>
<td>M (SD) n (%)</td>
<td>M (SD) n (%)</td>
</tr>
<tr>
<td>Extraversion</td>
<td>4.80 (1.20)</td>
<td>4.71 (1.18)</td>
<td>4.75 (1.19)</td>
</tr>
<tr>
<td>Openness</td>
<td>4.41 (1.15)</td>
<td>4.44 (1.13)</td>
<td>4.42 (1.14)</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>3.09 (1.12)</td>
<td>2.83 (1.07)</td>
<td>2.94 (1.10)</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>5.58 (0.85)</td>
<td>5.47 (0.83)</td>
<td>5.52 (0.84)</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>5.15 (0.90)</td>
<td>5.11 (0.89)</td>
<td>5.13 (0.90)</td>
</tr>
<tr>
<td>Age</td>
<td>41.93 (10.29)</td>
<td>41.74 (10.30)</td>
<td>41.82 (10.30)</td>
</tr>
<tr>
<td>Female</td>
<td>1477 (67.1)</td>
<td>1269 (45.0)</td>
<td>2746 (54.7)</td>
</tr>
<tr>
<td>Higher education</td>
<td>951 (43.2)</td>
<td>1411 (50.1)</td>
<td>2362 (47.1)</td>
</tr>
<tr>
<td>Income in 100,000 NOK</td>
<td>3.68 (1.58)</td>
<td>4.40 (2.63)</td>
<td>4.08 (2.26)</td>
</tr>
<tr>
<td>Partner at home</td>
<td>1653 (75.1)</td>
<td>2149 (76.3)</td>
<td>3082 (75.8)</td>
</tr>
<tr>
<td>Children &lt;11 years at home</td>
<td>765 (34.8)</td>
<td>957 (34.0)</td>
<td>1722 (34.3)</td>
</tr>
<tr>
<td>Long-term health problems</td>
<td>583 (26.5)</td>
<td>441 (15.7)</td>
<td>1024 (20.4)</td>
</tr>
<tr>
<td>Health limits daily tasks</td>
<td>214 (9.7)</td>
<td>115 (4.1)</td>
<td>329 (6.6)</td>
</tr>
<tr>
<td>Risk of depression</td>
<td>341 (15.5)</td>
<td>281 (10.0)</td>
<td>622 (12.4)</td>
</tr>
<tr>
<td>Daily smoking</td>
<td>492 (22.4)</td>
<td>468 (16.6)</td>
<td>960 (19.1)</td>
</tr>
<tr>
<td>Risky alcohol use</td>
<td>191 (8.7)</td>
<td>298 (10.6)</td>
<td>489 (9.7)</td>
</tr>
<tr>
<td>Manual occupation</td>
<td>787 (35.8)</td>
<td>789 (29.8)</td>
<td>1576 (31.4)</td>
</tr>
<tr>
<td>Job satisfaction</td>
<td>3.28 (0.50)</td>
<td>3.37 (0.45)</td>
<td>3.33 (0.47)</td>
</tr>
</tbody>
</table>

Table 2. Results of negative binomial regressions with sickness absence in 2008–2011 as dependent variable using survey weights and standardised continuous covariates (n = 4406).

<table>
<thead>
<tr>
<th>Variable</th>
<th>IRR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality dimensions included one by one (univariate models)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>1.04</td>
<td>0.98–1.11</td>
<td>.158</td>
</tr>
<tr>
<td>Openness</td>
<td>0.99</td>
<td>0.94–1.05</td>
<td>.815</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>1.26</td>
<td>1.19–1.34</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>1.06</td>
<td>1.00–1.13</td>
<td>.051</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>1.03</td>
<td>0.97–1.09</td>
<td>.328</td>
</tr>
<tr>
<td>All personality dimensions, age and gender included simultaneously</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>1.10</td>
<td>1.02–1.19</td>
<td>.015</td>
</tr>
<tr>
<td>Openness</td>
<td>1.02</td>
<td>0.95–1.09</td>
<td>.536</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>1.27</td>
<td>1.17–1.37</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>1.04</td>
<td>0.96–1.13</td>
<td>.312</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>1.00</td>
<td>0.92–1.08</td>
<td>.973</td>
</tr>
<tr>
<td>Age</td>
<td>1.19</td>
<td>1.10–1.28</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Female</td>
<td>1.98</td>
<td>1.70–2.31</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Note. Respondents 18–62 years old.

Other three remaining personality traits also continued to not be predictive of sick leave (p > .01). Higher age and being female were related to higher rates of sickness absence (IRR_age: 1.19, 95% CI: 1.10–1.28, p < .001; IRR_female: 1.98, 95% CI: 1.70–2.31, p < .001).

Third, all study variables were included in a full model to adjust for all risk factors of sick leave simultaneously (see first part of Table 3). The association between neuroticism and sickness absence remained significant in this model. The results further suggested that the estimated rate of sickness absence weeks increased statistically significantly by 14% with every standard deviation increase in extraversion (IRR: 1.14, 95% CI: 1.05–1.22, p = .002). Moreover, higher income was associated with a significant decrease in the rate of sick leave weeks, whereas having at least one long-term health problem and having depressive symptoms were related to a significant increase in the rate of sick leave weeks (p < .01).

Finally, the full model was rerun with a sample where respondents with previous sick leave (n = 767) were excluded. In this model, of all personality traits, only extraversion significantly predicted sick leave. Excluding respondents with previous sick leave did not substantially change the associations between the remaining covariates and sick leave other than being at risk of depression, which was no longer significantly related to sick leave (p = .102; see last part of Table 3).

We conducted additional single-item analyses to examine how each of the 20 personality items individually was associated with sick leave in the final, fully adjusted models where respondents with sick leave in 2007 were excluded. The results showed that one of the four extraversion items were significantly related to sick leave (p < .01), whereas one additional item showed a p-value of p < .05 (see online material S4 for these supplementary results at https://osf.io/5823a/).

All analyses were also rerun without survey weights, which did not change the results substantially, thus indicating robustness of the results.

Moderator analyses

We tested for moderator effects of all personality dimensions with gender, age, health measures, substance use, type of occupation and job satisfaction where each product term was included in separate full model analyses (including as such main effects from all predictors used in the study). The results yielded two significant moderator effects.

First, we found an interaction effect of age and openness on sick leave (IRR_age: 1.23, 95% CI: 1.13–1.33,
A graphical illustration of the interaction effect is provided in Figure 1. The figure suggests that for the oldest individuals (62 years old), higher scores on openness were associated with an increased estimated rate of sick leave weeks. In contrast, for the youngest part of the sample, those that were 18 years old, high scores on openness were associated with a decreased rate of sick leave weeks.

Second, type of occupation significantly moderated the association of agreeableness with sickness absence (IRRoccupation: 1.32, 95% CI: 1.06–1.64, p = .012; IRRagreeableness: 1.04, 95% CI: 0.96–1.16, p = .534).

### Table 3. Results of negative binomial regressions with sickness absence in 2008–2011 as dependent variable using survey weights and standardised continuous covariates, full models.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample including those with sick leave in 2007 (n = 3959)</th>
<th>Sample excluding those with sick leave in 2007 (n = 3365)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IRR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Extraversion</td>
<td>1.14</td>
<td>1.05–1.22</td>
</tr>
<tr>
<td>Openness</td>
<td>1.02</td>
<td>0.95–1.10</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>1.16</td>
<td>1.07–1.27</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>1.04</td>
<td>0.96–1.13</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>1.08</td>
<td>1.00–1.17</td>
</tr>
<tr>
<td>Age</td>
<td>1.23</td>
<td>1.13–1.34</td>
</tr>
<tr>
<td>Female</td>
<td>1.88</td>
<td>1.55–2.27</td>
</tr>
<tr>
<td>High education</td>
<td>0.89</td>
<td>0.72–1.10</td>
</tr>
<tr>
<td>Income in 100,000 NOK</td>
<td>0.81</td>
<td>0.72–0.90</td>
</tr>
<tr>
<td><strong>Family</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner at home</td>
<td>0.98</td>
<td>0.82–1.17</td>
</tr>
<tr>
<td>Children &lt;11 years at home</td>
<td>1.23</td>
<td>1.04–1.46</td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term health problems</td>
<td>1.54</td>
<td>1.28–1.85</td>
</tr>
<tr>
<td>Health limiting daily tasks</td>
<td>1.28</td>
<td>0.97–1.70</td>
</tr>
<tr>
<td>Risk of depression</td>
<td>1.36</td>
<td>1.10–1.69</td>
</tr>
<tr>
<td>Daily smoking</td>
<td>1.06</td>
<td>0.88–1.28</td>
</tr>
<tr>
<td>Risky alcohol use</td>
<td>0.97</td>
<td>0.75–1.26</td>
</tr>
<tr>
<td><strong>Work</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual occupation</td>
<td>1.32</td>
<td>1.06–1.64</td>
</tr>
<tr>
<td>Job satisfaction</td>
<td>0.94</td>
<td>0.88–1.02</td>
</tr>
</tbody>
</table>

Note. All independent variables included simultaneously. Respondents were 18–62 years old.

**Figure 1.** Predictive margins of sick leave weeks as a function of openness and age.

p < .001; IRR_{openness}: 1.02, 95% CI: 0.95–1.10, p = .534; IRR_{age*openness}: 1.12, 95% CI: 1.05–1.20, p = .001. A graphical illustration of the interaction effect is provided in Figure 1. The figure suggests that for the oldest individuals (62 years old), higher scores on openness were associated with an increased estimated rate of sick leave weeks. In contrast, for the youngest part of the sample, those that were 18 years old, high scores on openness were associated with a decreased rate of sick leave weeks.

Second, type of occupation significantly moderated the association of agreeableness with sickness absence (IRR_{occupation}: 1.32, 95% CI: 1.06–1.64, p = .012; IRR_{agreeableness}: 1.04, 95% CI: 0.96–1.16, p = .534).
1.14, 95% CI: 1.03–1.26, \( p = .013 \); IRR\(_{\text{occupation*agreeableness}}\): 0.81, 95% CI: 0.70–0.94, \( p = .005 \). Figure 2 illustrates this interaction effect by showing that for individuals working in primarily manual occupations, higher scores on agreeableness corresponded to a decrease in the estimated rate of weeks of sick leave. For individuals working in primarily non-manual occupations, however, higher scores on agreeableness tended to be related to an increase in the estimated rate of sick leave weeks.

**Discussion**

The main purpose of this study was to examine whether personality is associated with physician-certified sickness absence. Overall, the results suggested that after controlling for a variety of relevant covariates and excluding respondents with prior spells of sick leave, high levels of extraversion were prospectively related to an increased risk of sick leave. Furthermore, neuroticism was positively associated with sick leave even with control for covariates; however, the association diminished when excluding participants with prior spells of sick leave. Two interaction effects showed further the complex relationships between personality, age and work factors, and sick leave.

**The prospective associations between personality traits and sickness absence**

Neuroticism was related to an increased risk of future sick leave, also when health, family and work factors were included in the analyses. These findings are in line with studies that found cross-sectional (Störmer & Fahr, 2013; Vlasveld et al., 2013) and longitudinal (Blekesaune, 2012; Raynik et al., 2020) associations between neuroticism and sick leave with control for health factors. However, new in our study is the finding that the prospective association between neuroticism and sickness absence diminished into insignificance when removing respondents that had sick leave in the interview year. This result may thus suggest that the neuroticism-sickness absence association does not necessarily originate in causal mechanisms where neuroticism influences sickness absence, but that associations may be explained by confounding or reverse causal directionality. Such a notion is in accordance with research showing that major negative life events, for example, the onset of chronic disease, and associated mental distress and deterioration in life quality predict lasting increases in neuroticism (Jeronimus et al., 2014; Jokela et al., 2014).

The positive relationship between extraversion and sick leave corresponds with previous studies on extraversion and absenteeism (Furnham & Bramwell, 2006; Judge et al., 1997), but conflicts with the results of Vlasveld et al. (2013), who found a negative effect of extraversion on both shorter and longer sick leave spells (≥2 weeks). This latter study explains its findings in terms of extraverts possibly being less likely to deal with, for example, work stressors by means of avoidance coping through sick leave. In contrast, the positive associations between extraversion and absenteeism in other studies were suggested to originate from extraverts’ tendency to prioritise leisure and social obligations outside the work sphere, especially when work tasks are mundane (Furnham & Bramwell, 2006; Judge et al., 1997). This explanation, though, seems less intuitive for predicting longer term physician-certified sick leave. Possibly, the tendency of extraverts to take risks and seek excitement may increase the risk of long-term sick leave, as extraverts are more prone to substance use and accidents (Booth-Kewley et al., 1994; Terracciano et al., 2008). Alternatively, in line with the concept of presenteeism, individuals low in extraversion may be less likely to seek
sick leave even when being ill. More specifically, by having a tendency to be reserved and inhibited, these people may prefer to continue with their normal work activity in order not to attract attention and have to disclose themselves to the doctor and colleagues. Also, people with low levels of extraversion may refrain from going to the doctor and approaching colleagues and superiors for sick leave because of lower levels of self-worth and social skills compared to extraverted people (Ozer & Benet-Martinez, 2006; Robins et al., 2001). The present study did not provide data that allowed to test for these potential mechanisms of the association between extraversion and risk of sick leave. Future longitudinal studies with a more comprehensive assessment of extraversion, including facets such as excitement seeking and assertiveness, may provide the opportunity to test such mechanisms by disentangling the effect of specific facets of extraversion on sick leave.

The lack of any main effect of conscientiousness in our study was surprising, given earlier findings that conscientiousness is negatively related to work absence and the well-documented health- and task-directed nature of conscientious individuals. Nevertheless, the other previous study on personality and register-based sickness absence also did not find an effect of conscientiousness (Blekesaune, 2012); neither did a study based on longitudinal survey data (Raynik et al., 2020). This could indicate that the potentially buffering effect of conscientiousness on work absence primarily appears for absenteeism and more short-term sick leave. In fact, conscientiousness has been positively linked to emotional exhaustion (Armon et al., 2012). Thus, although conscientious individuals are committed and motivated in their work, which would generally yield negative associations to work absence, these characteristics might entail aspects that over time could predispose them for longer absences due to burnout as well (Armon et al., 2012; Woods et al., 2013).

Less surprising, however, was the non-significant main effect of openness on sickness absence, as it is in accordance with most previous studies and thereby supports the notion that this personality dimension does not appear to be an overall decisive predictor for work absence. Still, a moderator effect of openness with age on sickness absence was found, indicating that openness increased the risk of sick leave for older employees compared to younger employees. Possibly, for younger employees, openness may promote adaptation to shifting work demands and integration in new workplaces which are of importance early in an occupational career. In contrast, high levels of openness may impede job performances and increase risk of sick leaves among older employees when extensive experience makes work less challenging and more monotonous.

For agreeableness, the lack of a main effect did not support our hypothesis of a negative association with sick leave. Yet, the moderator analyses suggested that agreeableness might have some bearing on sick leave in more intricate manners. The identified moderator effect of agreeableness with type of occupation lends some support to our assumption that personality may have differential associations with sickness absence when contrasting occupations that are not physically demanding with manual occupations. Perhaps, highly agreeable persons may be less willing to be absent from work in manual occupations because they perceive the additional burden on colleagues due to their own absence to be greater in physically strenuous occupations compared to non-manual occupations. This seemingly complex association between personality, type of occupation and sick leave, may be an interesting area for future research.

**Strengths and limitations**

The present study is the first to examine in a nationally representative sample the longitudinal relationship between personality and physician-certified longer term sick leave using register data on sickness absence. The use of a large, representative survey sample combined with highly reliable register-based data on sickness absence is a major strength. Using register data on sickness absence is advised because self-reported sick leave is prone to recall bias and social desirability (Thorsen et al., 2018). Moreover, several previous studies relied on cross-sectional survey data, thereby providing limited information about the temporal relationship between personality and sick leave, which further clouds causal inference.

However, the study also has limitations. First, the available register data on sickness absence only provided information about spells of sick leave that lasted more than 16 days. Shorter periods of sick leave, including both self- and physician-certified spells were not assessed, and the present study provides no information about how such spells are related to personality. Furthermore, data on sickness absence only provided information about the accumulated number of weeks of sickness absence within a calendar year for each of the four years (2008–2011). It was thus not possible to differentiate between several shorter term spells of sickness absence and one long-term spell within the year.

We used a short version of a widely applied personality measure. Yet, with four items measuring each trait, the breadth of coverage of this measure is limited, and thus this may also have limited its potential in predicting the outcome. With a more comprehensive instrument, we would be able to capture more nuances and assess narrow personality facets, which may provide more detailed information, in addition to broad traits in predicting sickness absence (Judge et al., 1997; Lounsbury et al., 2004). Personality facets or items tend to outperform the broader personality traits in predicting a wide range of behavioural outcomes (Paunonen & Ashton, 2001; Seebooth & Mõttus, 2018). However, studies show that the Big Five seems sufficient for predicting work-related behaviour (Judge et al., 1997; Woods et al., 2013). Still, discrepancies in findings between studies may be the result of different representations of items of personality traits used. Also, a more comprehensive measure of personality would provide more information about different mechanisms that can operate at lower trait levels and disentangle whether facet or item level associations with sickness absence go in different directions.

We chose a rather conservative level of significance with \( p < .01 \); however, we acknowledge that interaction effects would be considered not significant with a more strict correction for multiple comparisons when conducting
moderation analyses. The two identified interaction effects should therefore be considered preliminary.

Finally, the generalisability of the study results may also be limited in other ways. Although the study sample was stratified to be nationally representative, the respondents were overall higher educated and healthier than the general population (Slagsvold et al., 2012), which could lead to somewhat biased study results. Nevertheless, the use of survey weights did not significantly change the results compared with un-weighted analyses, thus indicating that such biases in the sample do not appear to be a major concern. The findings may further not be generalisable to other countries that have less generous sickness benefit schemes, a less inclusive working life, higher unemployment, or other labour market conditions that are different from the Norwegian context and that may affect the sickness absence rate.

Conclusions

Previous studies on personality and sickness absence have concentrated on shorter periods of self-assessed absence, but the societal and individual costs are greater for longer term sickness absence. The present study is one of the first to show that, when taking long-term illness, chronic disease and previous sick leave into consideration, high levels of extraversion are associated with an increased risk of future longer term sickness absence. The association thereby implies that the relationship between extraversion and long-term sickness absence is not only a direct function of health but also seems to rely on other aspects related to this personality trait. In contrast, our study indicates that even though neuroticism is associated with future sick leave, this association may not remain when key confounding factors and previous sick leave incidents are included in the assessment. The causal nature of the association between neuroticism and longer term sickness is as such unclear and needs further examination.

Findings also indicate that associations between personality dispositions and longer term sick leave may depend on the type of occupation. These results suggest worthwhile future research and may be of particular interest to employers and practitioners. Future studies may also advance the understanding of personality’s role in predicting longer term sickness absence by studying interactive effects of personality dimensions. From societal and individual perspectives, neither the overuse nor underuse of sick leave is desirable (Alexanderson, 1998). Yet, understanding more of the dynamics of sickness absence, and gaining knowledge on whether personality is also a contributory factor to longer term sickness absence in general and potentially for some social groups in particular, can provide practice-relevant knowledge for workplace adaption and return-to-work programmes.

Acknowledgments

The authors would like to thank colleagues Tale Hellevik, Thomas Hansen and Viggo Nordvik, the editor and three reviewers for their comments on the paper.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study is supported by a grant from the Research Program on Sickness Absence, Work, and Health by the Research Council of Norway (#237993), von Soest’s work with the paper was additionally supported by grant #288083 from the Research Council of Norway. The funding sources were not involved in the study design, data collection, analysis and interpretation of the data or in the writing and submission of the present article. The Norwegian Life-Course, Ageing and Generation (NorLAG) data collections have been financed by two grants from the Research Council of Norway (#149564 and #168373); four ministries: Statistics Norway; and Norwegian Social Research. The NorLAG datasets are part of the ACCESS Life Course Infrastructure funded by a grant from the National Financing Initiative for Research Infrastructure at the Research Council of Norway (#195403) and by NOVA. The data that support the findings of this study are distributed by the Norwegian Centre for Research Data at https://doi.org/10.18712/NSD-NSD1461-V1. None of the aforementioned institutions are responsible for the current analyses and interpretations of the data.

Author’s Note

Gørl Kvamme Løset, Norwegian Social Research (NOVA), OsloMet – Oslo Metropolitan University, Oslo, Norway; Tilmann von Soest, PROMENTA Research Center, Department of Psychology, University of Oslo, Oslo, Norway, and Norwegian Social Research. The NorLAG datasets are part of the ACCESS Life-Course Infrastructure funded by a grant from the National Financing Initiative for Research Infrastructure at the Research Council of Norway (#195403) and by NOVA. The data that support the findings of this study are distributed by the Norwegian Centre for Research Data at https://doi.org/10.18712/NSD-NSD1461-V1. None of the aforementioned institutions are responsible for the current analyses and interpretations of the data.

Data accessibility statement

Supplementary material, code and analysis scripts for this article are available at https://osf.io/5823a/. Additional survey material and data are available at https://norlag.nsd.no and https://doi.org/10.18712/NSD-NSD1461-V1. The NorLAG data are accessible for research purposes from the Norwegian Centre for Research Data for researchers affiliated with a Norwegian research institution. Due to the extensive linkage to Norwegian register data, data are not allowed to be stored outside Norway.

ORCID iD

Gørl Kvamme Løset https://orcid.org/0000-0003-3837-318X

References


Soto, C. J. (2019). How replicable are links between personality traits and consequential life outcomes? The life outcomes of
Basic human values and sick leave: A study combining two-wave survey data with longitudinal register data

(Submitted to the Scandinavian Journal of Psychology)

Gøril Kvamme Løset
Tale Hellevik
OsloMet – Oslo Metropolitan University

Tilmann von Soest
University of Oslo and OsloMet – Oslo Metropolitan University

Author Note
Gøril Kvamme Løset, Norwegian Social Research (NOVA), OsloMet – Oslo Metropolitan University, Oslo, Norway, e-mail: goril.k.loset@oslomet.no; Tale Hellevik, Norwegian Social Research (NOVA), OsloMet – Oslo Metropolitan University, Oslo, Norway, e-mail: tale.hellevik@oslomet.no; Tilmann von Soest, PROMENTA Research Center, Department of Psychology, University of Oslo, Oslo, Norway, and Norwegian Social Research (NOVA), OsloMet – Oslo Metropolitan University, Oslo, Norway, e-mail: t.v.soest@psykologi.uio.no.

This research is supported by a grant from the Research Program on Sickness Absence, Work, and Health by the Research Council of Norway (#237993). von Soest’s work was additionally supported by grant #288083 from the Research Council of Norway. The funding sources were not involved in the study design, data collection, analysis and interpretation of the data, nor in the writing and submission of the present article. None of the
authors has any conflict of interest to declare related to this manuscript. Please address any correspondence concerning this manuscript to Gøril Kvamme Løset, Norwegian Social Research (NOVA), OsloMet – Oslo Metropolitan University, P.O. Box 4 St. Olavs plass, NO-0130 Oslo, Norway. E-mail: goril.k.loset@oslomet.no. https://orcid.org/0000-0003-3837-318X

The Norwegian Life-Course, Ageing and Generation (NorLAG) data collections have been financed by the Research Council of Norway; the Ministry of Health and Care Services; Ministry of Labour; the Ministry of Children, Equality and Social Inclusion; the Ministry of Local Government and Regional Development; the Norwegian Directorate of Health; the Norwegian State Housing Bank; Statistics Norway and Norwegian Social Research, Oslo Metropolitan University. NorLAG data are part of the ACCESS Life Course infrastructure funded by grants from the National Financing Initiative for Research Infrastructure at the Research Council of Norway (#195403 and #269920). The data that support the findings of this study are distributed by the Norwegian Centre for Research Data for research purposes at https://doi.org/10.18712/norlag3_1.

The NorLAG study and data collections were reviewed and approved by the Norwegian Centre for Research Data and the Data Protection Officer for Research at Statistics Norway. The data are fully anonymous.

All authors declare that they have no conflicts of interest.
Abstract

There is growing recognition that dispositional factors and social norms can predict work absence. Human values have been linked to related concepts, including work commitment and receipt of disability pension; however, there is a lack of research on whether human values are associated with sickness absence. We address this issue by combining survey data from two waves (2007, 2017) of the Norwegian Life-Course, Ageing and Generation Study (N = 1,330) with longitudinal register data on sickness absence between survey waves. Stepwise regression analyses showed that, out of Schwartz’ ten basic values, achievement was prospectively associated with higher levels of self-reported sick leave, even when controlling for a variety of covariates. Self-direction was also related to higher risk of self-reported sick leave in the adjusted analysis. Conservation values (security and conformity) were related to stricter attitudes towards sick leave when controlling for covariates, while stimulation was associated with lenient sick leave attitudes in the adjusted analysis. None of the human values were prospectively associated with longer-term register-based sick leave beyond bivariate correlations. We conclude that broad human values to some extent predict attitudes towards sick leave and self-certified sick leave where persons may vary according to which degree they consider sick leave to be necessary and appropriate, while human values do not predict long-term, physician-certified sickness absence. Future research may examine whether health- or work-specific values have greater explanatory power for sick leave, including long-term sickness absence that is typically more closely linked to more serious health problems.

Keywords: human values, attitudes, sickness absence, sick leave, absenteeism, health
Basic human values and sick leave: A study combining two-wave survey data with longitudinal register data

The economic costs of extensive sick leave are a common concern across industrialised countries (OECD, 2010). Furthermore, long-term sickness absence increases the risk for the individual employee of wage penalty, disability pension and permanent work life withdrawal (Hultin et al., 2012; Markussen, 2012). Understanding the mechanisms behind the variations in sickness absence levels and finding measures that will help reduce the prevalence of sick leave is therefore on the political agenda (Mykletun et al., 2010).

The employee’s somatic and mental health condition is considered a key determinant of sick leave behaviour. This seems to particularly apply to physician-certified absence of more than one week’s duration, since such absence is not only associated with poor health, but also with a higher risk of mortality (Ferrie et al., 2009; Kivimäki et al., 2003; Marmot et al., 1995). However, extensive research has shown that factors not directly related to health also are of importance for sick leave. Such factors include the work environment (Laaksonen et al., 2010), family factors (Allebeck & Mastekaasa, 2004; Markussen et al., 2011), social support (Miraglia & Johns, 2021) and social norms and interactions (Godøy & Dale-Olsen, 2018). Moreover, previous studies have suggested that dispositional factors, such as personality (Vlasveld et al., 2013; Störmer & Fahr, 2013) and temperamen (Henderson et al., 2009), may play a part.

Employees’ attitudes and values are emphasised in the scientific literature and public debate as potential sources of variations in sick leave. A previous review article also stated that values deserve more interest in the sickness absence literature (Harrison & Martocchio, 1998). Still, factors in this domain have so far only been examined to a limited extent (Allebeck & Mastekaasa, 2004; Hauge & Ulvestad, 2017). Addressing this lack of research, the present study uses longitudinal survey and register data to examine how human values –
defined as overarching trans-situational goals that motivate behavioural decisions and modes of conduct (Rohan, 2000; Schwartz, 1992) – are associated with sick leave and attitudes towards sick leave. The study will as such be the first to examine the prospective association of human values with sick leave.

**Human Values: Theory and Concepts**

By drawing on earlier work within value research, Schwartz and Bilsky (1987) developed the Theory of Basic Human Values in an attempt to map out a universally shared value system. The theory defines values as basic cognitive orientations, broad criteria or principles that are relevant to guide and justify attitudes and behaviour across life domains. In contrast to specific attitudes that are considered evaluations of a particular object or situation, values take the form of global goals for desirable behaviour (Schwartz, 2003). Schwartz’ theory has identified ten basic and motivationally distinct value types that are supported across cultures (Schwartz, 1992, 2003). The values are dynamically integrated and form individual value priorities according to their relative importance, often illustrated as a circular motivational continuum where values that are close to each other in the circle have more compatible goals while more distant values have more conflicting defining motivations. The circular structure can also be summarised in four higher-order values that form two bipolar value dimensions, *self-enhancement* versus *self-transcendence* and *openness to change* versus *conservation* (Schwartz, 1992; Schwartz et al., 2001).

Self-enhancement comprises the values of *power* and *achievement*, for which social superiority, personal interests and success are defining motivations. In contrast, *universalism* and *benevolence* are seen as self-transcending values that are concerned with protecting the welfare and interests of others. Openness to change emphasises the intrinsic interest in novelty and independence of thought, action and feelings that lies in the values of *stimulation* and *self-direction*. With emphasis on preservation of the past, order, self-moderation and
HUMAN VALUES AND SICKNESS ABSENCE

resistance to change, three basic values – *tradition*, *conformity*, and *security* – form the core value of conservation. The defining goals of the tenth value, *hedonism*, which has motivating elements of both openness to change and self-enhancement, are individual pleasure and sensuous gratification (Bilsky et al., 2011; Schwartz, 2012).

**Associations between Human Values, Attitudes and Sick Leave**

According to Schwartz’ theory, individuals attempt to act in accordance with their values to achieve consistency between their beliefs and their actions and to increase the likelihood of achieving their preferred goals (e.g., Bardi & Schwartz, 2003). The motivating role of values in behaviour is argued to be higher when choice and conscious decision-making are involved (McClelland, 1985; Bardi & Schwartz, 2003). With regard to sick leave behaviour, except in cases of serious illness, it seems reasonable to assume that some form of weighing of options will take place whereby the individual’s value system may come into play. Indeed, several psychosocial models for sickness absence postulate that motivated behaviour, coping strategies and decision-making are involved in the individual sick leave process (see Bakker & Demerouti, 2007; Henderson et al., 2011; Zimmermann et al., 2016). Assessments of when sick leave is necessary or acceptable may depend on considerations and priorities related to health and key life domains such as work and family and whether sick leave, given the situation, is seen as functional and consistent with a person’s values or related goals (Zimmermann et al., 2016).

Basic human values have been associated with a variety of behavioural and attitudinal outcomes in many life areas, for example political activism (Vecchione et al., 2014) and attitudes toward immigration (Davidov et al., 2014). Human values have also been linked to health, including subjective well-being (Sortheix & Schwartz, 2017) and mortality (Beller, 2021). Yet, to our knowledge, there is little research on the motivating potential of human values in relation to sickness absence. However, three studies have examined how human
values are related to constructs similar to sickness absence, including workplace commitment (Cohen, 2009), disability pension (an outcome often preceded by long-term sick leave; Blekesaune, 2015) and attitudes towards sick leave (Haugen et al., 2008). We comment on previous findings below.

From a theoretical point of view, we expect that individuals holding self-enhancement values are more likely to have stricter attitudes towards sick leave and less risk of sick leave compared to others because sick leave may be perceived as hindering individual goals of personal success and prestige in the work place. These expectations are supported by findings showing that achievement was related to higher work commitment in a cross-sectional survey study of 424 Israeli employees (average age of 37.5 years; Cohen, 2009) and to reduced risk of disability pension in a Norwegian study of 2,549 respondents, aged 50–66 years (Blekesaune, 2015). However, in a study using survey data with prospective register records on mortality for 6,089 German respondents (aged 40–93 years), power was linked to an increased mortality risk (Beller, 2021), indicating that these individuals may have a higher risk of sick leave because of ill health. Overall, we suggest that self-enhancement is associated with stricter sick leave attitudes, but due to mixed findings with more health-related outcomes, it remains somewhat unclear how self-enhancement values and actual sick leave are related.

Self-transcendence values are concerned with being loyal, understanding, protecting of others’ well-being and nurturing close relationships with significant others (Schwartz, 2012), and we therefore expect that these values are related to being tolerant of sick leave. Such a notion is in accordance with the finding that self-transcendence values were positively associated with acceptance of sick leave in a cross-sectional survey study including 22,423 Swedish employees that were 20–64 years old (Haugen et al., 2008). Still, individuals high in benevolence also are shown to be particularly committed to work (Cohen, 2009), which may
HUMAN VALUES AND SICKNESS ABSENCE

indicate that they have a higher threshold for sick leave. Thus, even though self-transcendence values probably are related to more lenient attitudes towards sick leave in general, self-transcendence-oriented individuals may not necessarily be at higher risk for sick leave because of their strong work commitment.

Embracing curiosity, novelty, and independence of thought and action is central to openness to change values (Schwartz, 1992). These values are found to be negatively associated with organisational commitment and job involvement (Cohen, 2009), which in turn may lead to a lower threshold for sick leave among those valuing openness to change. However, in a large cross-sectional survey study of adults in numerous European countries, openness to change values were positively correlated with subjective well-being (high life satisfaction and low depressive affect; Sortheix, & Schwartz, 2017), and self-direction has been associated with a decreased mortality risk (Beller, 2021). This suggests that openness to change-oriented individuals generally are in good health and should have a lower risk of sick leave. On this basis, we expect openness to change to be associated with lenient attitudes towards sick leave but the relationship to actual sickness absence is more uncertain for these values.

In theory, we would expect individuals who prioritise conservation values to have stricter attitudes towards sick leave and a lower risk of sick leave, because moderation, social order, harmony and keeping a low profile are important to them (Schwartz, 2012) and being absent from work may conflict with these ideals. Yet a previous study found that conservation values were negatively correlated with subjective well-being (Sortheix, & Schwartz, 2017), which may indicate risk of sick leave due to health reasons. However, research on the relationship between conservation and health- and work-related outcomes is sparse, and more research is needed. From a theoretical standpoint, we still anticipate that these values will be associated with a higher threshold for sick leave.
Finally, hedonism-oriented individuals are concerned with personal pleasure and enjoyment in life, and they do not appear to be particularly committed to their job or workplace (Cohen, 2009). From this perspective, hedonism may be related to less stringent sick leave attitudes and a greater propensity to use sick leave. Research has linked hedonism to an increased risk of mortality (Beller, 2021), which could also indicate that people with hedonistic values run a higher risk of sick leave. Nevertheless, hedonism has been related to a reduced risk of disability retirement, partly explained by the fact that hedonistic individuals often seem to feel that they are in good health (Blekesaune, 2015). Due to mixed results and sparse research, it is thus not entirely clear how hedonism will be linked to sick leave and related attitudes.

Potential Confounders of the Association between Values and Sickness Absence

When examining the associations between values and sick leave, it is important to account for potential confounders. Such confounders include socio-economic status (SES) and gender, as research has repeatedly shown that low SES (Allebeck & Mastekaasa, 2004; Markussen et al., 2011) and female gender (Barmby et al., 2002; Mastekaasa & Melsom, 2014) are associated with higher risk of sickness absence. Older age is also positively associated with sick leave in several studies (Allebeck & Mastekaasa, 2004; Barmby et al., 2002). In addition, we control for health, because sick leave is certified on the basis of somatic and mental health problems, and human values are correlated with health outcomes (Beller, 2021). Work situation is a potential confounder as well because job type is associated with sick leave patterns (Markussen et al., 2011; Laaksonen et al., 2010) and differences in attitudes towards sickness absence (Mastekaasa et al., 2021). Some studies further suggest that partner status and having children are related to sick leave (Allebeck & Mastekaasa, 2004; Mastekaasa, 2013), and family variables are therefore also included as covariates.

The National Context
HUMAN VALUES AND SICKNESS ABSENCE

The Norwegian labour market is characterised by relatively low unemployment, high labour force participation and a high sickness absence rate compared with many other countries, including neighbours in Northern Europe (OECD, 2019). In a large part owing to prevailing support for the welfare state and trade unions, Norway also has a generous sickness benefit system. Self-certification is valid for the first three absence days (the first eight for firms that follow the Inclusive Working Life Agreement). For longer spells, the employer usually finances the first 16 calendar days of absence, whereas the Norwegian National Insurance Scheme provides sickness benefit when the employer-covered period expires (Hagelund, 2014). The sickness benefit replacement rate of wages is 100%, up to a ceiling of six times the public pension base rate (approx. 600,000 NOK), from the first day and up to one year of sick leave (Markussen et al., 2011). Employers often supplement the remaining wage if it exceeds the fixed ceiling. With better wage compensation for sick leave than in many other countries, the Norwegian context may also be particularly interesting for studying incentives for sickness absence that are not economically driven (Godøy & Dale-Olsen, 2018).

The Present Study

The aim of the present study is to examine the prospective association of human values with attitudes towards sickness absence and the risk of sickness absence among Norwegian employees, even when accounting for a variety of covariates. Based on previous work, we hypothesise that values related to self-enhancement and conservation overall are negatively associated with tolerant sick leave attitudes, and that conservation is related to a lower risk of sick leave, whereas we do not have an a priori prediction of the association between self-enhancement and the risk of sick leave. We further hypothesise that openness to change and self-transcendence values are positively associated with tolerant attitudes towards sick leave, and that self-transcendence values are associated with a higher risk of sick leave.
Due to mixed findings, no hypothesis concerning the relationship between *hedonism* and sick leave and attitudes towards sick leave is proposed.

**Method**

**Study Procedure and Participants**

We use two waves from the Norwegian Life-Course, Ageing and Generation Study (NorLAG). Statistics Norway collected the data, in collaboration with Norwegian Social Research, through telephone interviews and follow-up self-completion questionnaires. The first wave of data collection in NorLAG was conducted in 2002 (T1) with a sample of individuals born between 1922 and 1961, stratified by age and gender, in 30 municipalities and urban districts in Norway (N = 5,555). In the second wave of NorLAG in 2007 (T2), the gross sample from T1 was supplemented with refreshment samples for those born 1922–1961 and a set of younger birth cohorts (1962–1966). The sampling at T2 was further expanded to seven geographical regions covering the whole of Norway and the sample was stratified by gender, age, geographical region and municipal centrality. T2 accordingly comprises a sample of 9,238 interviewees (born 1922–1966, aged 40–85 years) with a response rate of 61%, and 77% of the respondents also completed the questionnaire (overall response rate of 47%; Veenstra et al., 2021).

The third round of NorLAG (T3) was carried out in 2017. Eligible participants at T3 were born between 1922 and 1966 and had participated in at least one of the two prior survey waves. The net sample covered 6,099 interviewees between the ages of 50 and 95 (68% response rate) and 73% of these individuals completed the questionnaire (overall response rate of 50%). Both study participation and the linkage of individual survey data with data from national administrative registers were based on informed consent (see Veenstra et al., 2021 for a more detailed account of the NorLAG study design).
Non-response bias was generally small, but non-responders more often had only basic education, which resulted in a modest overrepresentation of respondents with higher education (university college or higher) at both T2 and T3. Moreover, respondents with good self-rated health and higher education were more inclined to participate in multiple survey waves (Veenstra et al. 2021). NorLAG data are available for research purposes from the Norwegian Centre for Research Data (NorLAG, 2020). In the following, T2 and T3 will be referred to as baseline and follow-up, respectively.

To study the relationship between values, sick leave attitudes and sickness absence, we selected baseline respondents that had participated at follow-up (n = 5,711), because information on attitudes was only available at follow-up. Moreover, to be eligible for sick leave, respondents needed to be employed, not self-employed, in both study waves (n = 3,748 baseline; n = 2,272 follow-up) and earning an annual minimum of 50% of the public pension base rate (around 40,000 NOK) during the whole 10-year period (n = 2,104). Respondents also needed to be below 67 years old at follow-up to be entitled to sick leave during the whole study period (n = 1,989). The respondents additionally needed to have filled out the questionnaire in both survey waves (n = 1,624 baseline; n = 1,330 follow-up). The final study sample thus comprised 1,330 individuals aged 40–57 years at baseline.

Comparing the sample of study respondents who only participated in the interviews in both study waves with that of those who also filled the questionnaire in both waves showed that the latter respondents were slightly older (t = 2.57, p = .011; 47.5 years versus 46.6 years) and more likely to be female (χ² = 30.2, df = 1, p < .001), but the groups did not significantly differ in terms of educational level, self-rated health or the prevalence of sick leave between survey waves (p > .05).

**Measures**

*Sickness Absence*
Information on self-reported sick leave was derived from the telephone interview at follow-up by asking whether respondents had been absent from work because of their own illness in the past 12 months (no = 0; yes = 1). Data on register-based sickness absence were extracted from Statistics Norway’s nationwide Historical Event Database and linked to individual survey data. These data concern the length of sickness benefit for physician-certified sickness absence that the employee received from the Norwegian National Insurance Scheme (excluding the 16-day employer period). The records cover the annual sum of sick leave days between the two survey waves (2008–2016) and the data were collapsed into a variable that informed whether the respondent had such sick leave in this period (no = 0; yes = 1). We additionally used register-based sick leave in the year before baseline (2006) as a control for previous sick leave (0 = no; yes = 1).

**Attitudes towards Sickness Absence**

We employed an eight-item measure of attitudes towards sickness absence at follow-up, modelled after items used in the Norwegian Monitor survey (Ipsos MMI, 2015). The items were introduced by the phrase “For how long do you think it is acceptable to be on sick leave for the following reasons …?”, with items covering reasons for sick leave such as stress at work, exhaustion and moderate symptoms of illness (see Appendix 1 for an overview of all items). Response categories were no reason for sick leave (0), sick leave for 1–3 days (1), up to 2 weeks of sick leave (1), up to 4 weeks of sick leave (1), and more than 4 weeks of sick leave (1), in addition to don’t know, which was counted as a missing response. The items were combined into an attitude index indicating the mean number of reasons respondents considered a sick leave of at least 1–3 days to be reasonable. Cases with missing responses on more than four attitude items were not included in the index (n = 144). The scale showed adequate internal consistency (α = .67).

**Human Values**
HUMAN VALUES AND SICKNESS ABSENCE

The Human Values Scale (HVS), a 21-item version of the Portrait Values Questionnaire (PVQ), developed for the European Social Survey (ESS), was applied to assess values at baseline (Schwartz, 2003; Schwartz et al., 2001). A few adjustments were made to the HVS scale to adapt it more to the cultural context of the NorLAG study. Accordingly, gender-neutral items, rather than items addressed according to the respondent’s gender, were used, and one phrase described each item, as opposed to two in the original HVS. Moreover, one of the items that measured security in HVS was replaced with another security item from the original PVQ (Schwartz et al., 2001) to further adapt the scale to the Norwegian context (Appendix 2 gives an overview of the items in the revised version of the HVS used in the present study).

Two items (three items for universalism) measured each of the ten values through short verbal portraits featuring a hypothetical person, which described central goals and aspirations to the value (Schwartz, 2003). All items were introduced by the phrase “It is important to this person …”, and respondents rated how similar the person was to himself or herself with the response categories very much like me (1), like me (2), somewhat like me (3), a little like me (4), not like me (5) and not like me at all (6). Scores were mean centred to correct for individual differences in scale use, as suggested by Schwartz (2010); hence, scores indicated the relative importance of each value in the respondent’s value system. Reliability scores for each human value ranged from .36–.70 with an average of .54 (power: α = .39; achievement: α = .55; hedonism: α = .67; stimulation: α = .70; self-direction: α = .36; universalism: α = .62; benevolence: α = .68; security: α = .46; tradition: α = .37; conformity: α = .64). The low to moderate reliability scores were expected and reflect that few relatively heterogeneous items were chosen to capture the conceptual breadth of each value type (Schwartz, 2003). The HVS is a well-established instrument that has been part of the biennial ESS study since 2002. The scale has demonstrated adequate validity across many samples.
HUMAN VALUES AND SICKNESS ABSENCE

from different countries and cultures (Schwartz, 2003, 2007).

Health and Socio-Demographic Data

Self-rated health was measured by a single interview item where respondents were asked to rate their health for the moment as excellent, very good, good, moderately good or poor. The item was coded into a dichotomous variable (poor or moderately good health = 0; good, very good or excellent health = 1). A combination of interview data and register records provided information about whether the respondent was sharing the household with a partner (no = 0; yes = 1) or living with dependent children, operationalised as children below 11 years old (no = 0; yes = 1). Work factors comprised whether the respondent’s main work was classified as private (0) or public sector employment (1), whether work was part-time (below 37 working hours a week; 0) or full-time (1), and whether the work position involved coordinator or managerial responsibilities (no = 0; yes = 1). Other socio-demographic control variables included gender (male = 0; female = 1) and age. Also, gross income (in 10,000 NOK) and level of education (no university or college education = 0; university or college education = 1) were assessed. All these measures were obtained at baseline.

Statistical Procedure

A series of stepwise linear regression analyses served to investigate whether human values at baseline were related to attitudes towards sickness absence at follow-up. We conducted separate analyses for each human value. First, we examined unadjusted bivariate associations between the human value and sick leave attitudes. Second, we controlled for age and gender. Third, we included all the remaining control variables, except for register-based sick leave in the year prior to baseline, which was introduced in the fourth and final step. The same analytic approach was used when predicting self-reported sick leave at follow-up and register-based sickness absence between baseline and follow-up. For these outcomes, logistic regression analyses were used.
HUMAN VALUES AND SICKNESS ABSENCE

Results

Descriptive Statistics

The mean age of the 1,330 respondents was 47.65 (SD = 4.42; range 40–57) at baseline (see Table 1). Women were overrepresented in the sample (55.9%) and almost half the sample had higher education (47.9%). Relatively few respondents had younger children in the household (23.1%), whereas the large majority were living with a partner (82.0%). Moreover, most respondents were full-time employees (83.2%), about half of the sample had jobs in the public sector and 54.1% had a managerial job. Mean income was about 460,000 NOK. The bulk of the respondents considered themselves to be in good health (89.4%), and 16.7% had register-based sick leave the year prior to baseline. According to register records, 60.3% had sick leave between baseline and follow-up, and 45.9% reported having had sick leave in the year prior to follow-up. Mean score on the sick leave attitude index was 0.64, indicating that the respondents on average supported sick leave more often than not. Women generally had higher levels of sickness absence as well as more lenient attitudes towards sickness absence. We did not find a significant gender difference in self-rated health. Mean centred human values scores further showed that men on average scored higher on self-enhancement and openness to change values than women, and that women rated self-transcendence values, security, and conformity higher than men. Men also seemed to value tradition slightly more than women, whereas women seemed to value hedonism slightly more than men.

Bivariate correlations (Table 2) showed that human values forming the same higher order core value were, for the most part, moderately correlated with each other. Hedonism was negatively correlated with self-enhancement values and with self-direction, but not significantly correlated with stimulation. Education was positively correlated with universalism, self-enhancement and openness to change values, and negatively correlated
HUMAN VALUES AND SICKNESS ABSENCE

with conservation values, whereas age displayed few correlations with human values. Both work hours and work position were positively associated with self-enhancement and openness to change values and negatively associated with self-transcendence and conservation values. No human values were significantly associated with self-rated health.

Associations of Human Values with Sickness Absence and Attitudes towards Sickness Absence

Table 3 shows the results from linear regression models with attitudes towards sickness absence at follow-up as outcome. In Step 1, without control for covariates, none of the human values were significantly related to attitudes. However, when controlling for gender and age in Step 2, security was negatively related to attitudes and the association remained statistically significant when controlling for all the other covariates, including socio-economic status, work and family variables, and previous sick leave (Step 4). Moreover, in the final two steps (Steps 3 and 4), conformity was negatively related to sickness absence attitudes, whereas stimulation had a positive association with sickness absence attitudes.

When examining predictors of self-reported sick leave, logistic regression analyses showed significant associations of achievement and power with sick leave at follow-up without control for covariates (Step 1, Table 4). Nonetheless, only achievement displayed significant associations when controlling for covariates in Steps 2–4. Results from the final fourth step showed that a difference of one unit in achievement was associated with 33% higher odds of prospective sick leave compared to no sick leave ($p = .001$). Moreover, even though self-direction did not show a significant bivariate association with sick leave in Step 1 ($p = .128$), significant associations emerged when control variables were included in the model, such that a one-unit difference in self-direction represented a 22% increase in odds of prospective self-reported sick leave in the final model ($p = .032$).
A final set of stepwise binary regression analyses treated register-based sick leave between survey waves as the outcome (Table 5). In Step 1, power ($p = .006$) and self-direction ($p = .035$) were negatively related to the risk of prospective register-based sick leave, while benevolence ($p = .001$) and security ($p = .036$) were positively associated with such sick leave. However, all associations became insignificant when adjusted for covariates (Steps 2–4).

**Discussion**

The aim of the present study was to examine whether human values are prospectively associated with attitudes towards sickness absence and to actual, self- and register-reported, sickness absence. Results showed no bivariate associations between human values and sick leave attitudes, but associations between security, conformity and stimulation values and such attitudes emerged when controlling for other covariates. Although power initially was significantly correlated with self-reported sick leave, only achievement and self-direction were significantly related to self-reported sick leave in full models. Power, self-direction, benevolence, and security were merely bivariately related to register-based sickness absence. Self-transcendence values and hedonism were not related to any of the outcome measures in adjusted analyses.

**Associations between Human Values and Sick Leave Attitudes and Behaviour**

Power was associated with less risk of sick leave in bivariate analyses; however, this relationship diminished when controlling for basic sociodemographic factors such as age and gender. In contrast, the other self-enhancement value, achievement, was positively associated with the risk of self-reported sick leave, even when controlling for a variety of potential confounders. This result was somewhat surprising given previous findings that achievement was related to reduced risk of disability pension (Blekesaune, 2015) and the strong link between achievement and work commitment (Cohen, 2009). A possible explanation for this
association may be that achievement has been linked to higher levels of stress and anxiety (Hanel & Wolfradt, 2016), and higher intake of alcohol (Nordfjærn & Brunborg, 2015), which may result in a higher risk of sick leave. The fact that we find no association between achievement and register-based sick leave (which only encompasses longer sick leave spells) could indicate that achievement-oriented individuals are more prone to take shorter breaks from work, if such a breather is seen as acceptable and functional to achieving their desired goals in the long run, but are hesitant to take longer periods of absence that could harm their careers.

In line with our prediction for openness to change values, stimulation was associated with more lenient attitudes towards sick leave in adjusted analyses. Individuals who value self-direction also had an increased risk of self-reported sick leave when controlling for covariates in the analysis. The absence of a significant relationship between self-direction and register-based sick leave beyond a bivariate association supports the assumption that individuals who prioritise this value primarily do not have longer absences, which typically are associated with more severe health issues, while their threshold for shorter absences is somewhat lower than that of other people. The results may be explained by self-direction to be related to independence of thought and exploration, and that persons high on self-direction do not seem to be particularly attached to their workplace (Cohen, 2009).

We predicted that conservation values would be related to stricter sick leave attitudes and lower risk of sick leave. Although security was correlated with increased risk of prospective register-based sick leave, none of these values were associated with actual sick leave when controlling for covariates. However, in line with our prediction, both conformity- and security-oriented individuals displayed more restrictive attitudes towards sick leave. This finding is in accordance with the tendency of conservation-oriented individuals to be moderate and follow rules.
Possible Explanations for the Modest Findings between Human Values and Sick Leave

Values are considered to be fundamentally important for how people orient in life, guiding attitudes and behavioural decisions, and are often used to help explain why individuals behave the way they do (Bardi & Schwartz, 2003). However, in the present study we found relatively few associations with sick leave and sick leave attitudes. One potential explanation of this finding may concern bandwidth fidelity, which refers to the idea that broad human values may be too broad and distant to accurately predict a rather specific behaviour such as sick leave. In that regard, values that are more specifically related to work, health or illness may have greater explanatory power and should be examined more closely in future research.

Moreover, individuals do not always act in line with their values, partly because social value systems are assumed to interact with personal value systems and influence decisions about what is appropriate (Rohan, 2000; Cieciuch, 2017). Normative pressures may be particularly relevant for sick leave and may partly explain the modest findings, and studies show that social norms and interactions in the workplace are related to sick leave behaviour (e.g., ten Brummelhuis et al., 2016; Godøy & Dale-Olsen, 2018). Studies also suggest that some value types generally are more obscured by social norms and more weakly correlated with behaviour than others such as conformity (Bardi & Schwartz, 2003). This may partly explain the finding that conformity predicted attitudes towards sick leave in our study but was not correlated with actual sick leave.

Although we consider our findings regarding the relationship between human values and sick leave to be relatively modest, they still provide indications that broad human values are predictive of sick leave to some extent. Most notably, human values were related to both attitudes towards sick leave and self-reported sickness absence, which mainly included shorter self-certified absence; however, human values did not predict purely physician-
HUMAN VALUES AND SICKNESS ABSENCE

certified longer sick leave that is more closely associated with chronic and serious health problems. Our conclusion is therefore that human values are associated with sick leave in situations that are likely to involve greater room for individual assessments of whether sick leave is necessary (i.e., sick leave attitudes and self-certified absence), but other factors may be of greater importance when predicting long-term sickness absence.

Strengths and Limitations

The present study is one of the first to examine whether human values are associated with sick leave and sick leave attitudes. Major strengths are the use of a large sample size and longitudinal survey and register data. However, several limitations have to be noted. Even though objective register measures of sick leave were available, the measures do not distinguish between the length of the sick leave spells or the number of spells. Moreover, the register records on sick leave do not provide any information on self- or physician-certified sick leave below 17 days, and we therefore included self-reports of sick leave episodes in additional analyses.

Our 8-item index of sick leave attitudes provides a detailed measure of this construct, and the use of hypothetical situations leaves more scope for value priorities to come into play than questions on strictly health related issues, which strengthens our confidence in our results. However, the measure also has limitations since it has not been carefully tested and used in many other surveys.

The application of a widely used scale for measuring values is also a study strength and may facilitate the comparison of study results with other studies. Still, values are latent, abstract constructs that can be particularly challenging to capture with brief survey instruments, and the validity of the HVS has been questioned in recent years. For example, some studies have pointed to low reliability and lack of discriminant validity between some of the values, and revised short forms of the HVS and PVQ, and alternative groupings of the
human values, have therefore been proposed (e.g., Knoppen & Saris, 2009; Sandy et al., 2016). Future studies may gain more insight into the relationship between human values and sick leave with improved versions of the values scale.

The study was based on a survey sample that was stratified to be representative of the adult Norwegian population 40 years and older. However, due to non-response and selective attrition between study waves, respondents with higher education and good health were overrepresented in our sample. Ideally, our sample should have also included younger adults, but data from younger adults were not available. Finally, the findings from our study may have limited external validity to countries that have less generous welfare systems than Norway’s and substantially different labour market conditions. Whether human values are associated with sick leave in other countries is yet to be examined.

**Conclusion**

The social patterns in sick leave cause concern for increasing social differences in society (Mykletun et al., 2010). Values and attitudes have been proposed as part of the explanation for differences in levels of sickness absence. *Achievement* and *self-direction* were associated with a greater risk of self-reported sick leave in our study. *Stimulation*, a value that is conceptually linked to *self-direction*, was also related to more lenient attitudes towards sick leave, whereas *conservation* values were associated with having stricter attitudes. Still, none of the ten human values were related to the risk of receiving sickness benefit due to long-term physician-certified sick leave. We thus conclude that broad human values can predict shorter sick leave spells and attitudes towards sick leave to some extent, but that these values generally do not appear to predict longer-term sick leave that is likely to be more closely linked to mental and somatic health. Being aware of value priorities that can contribute to lenient or strict thresholds for shorter-term sick leave may be useful for managers who are responsible for following sick leave in the workplace. Recommendations for future research
HUMAN VALUES AND SICKNESS ABSENCE

are to assess whether health- or work-focused values can provide greater explanatory power for sickness absence.

**Data Availability Statement**

The data that support the findings of this study are openly available to students and researchers affiliated with a Norwegian research institution for research purposes. The data are distributed by the Norwegian Centre for Research Data at https://doi.org/10.18712/norlag3_1.
References


Hanel, P. H. P., & Wolfradt, U. (2016). The ‘dark side’ of personal values: Relations to
HUMAN VALUES AND SICKNESS ABSENCE


HUMAN VALUES AND SICKNESS ABSENCE


HUMAN VALUES AND SICKNESS ABSENCE


HUMAN VALUES AND SICKNESS ABSENCE


### Table 1

**Descriptive Statistics for the Total Study Sample and by Gender**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total sample (N = 1,330)</th>
<th>Men (n = 586; 44.1%)</th>
<th>Women (n = 744; 55.9%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>M (SD)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Sick leave at follow-up (self-report)</td>
<td>610 (45.9)</td>
<td>218 (37.2)</td>
<td>392 (52.7)</td>
</tr>
<tr>
<td>Sick leave attitudes at follow-up</td>
<td></td>
<td>0.64 (0.24)</td>
<td>0.63 (0.23)</td>
</tr>
<tr>
<td>Sick leave register (2008–2016)</td>
<td>802 (60.3)</td>
<td>289 (49.3)</td>
<td>513 (69.0)</td>
</tr>
<tr>
<td>Sick leave register prior to baseline (2006)</td>
<td>222 (16.7)</td>
<td>68 (11.1)</td>
<td>154 (20.7)</td>
</tr>
<tr>
<td>Human values at baseline (mean centred)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>-1.11 (0.71)</td>
<td>-0.94 (0.69)</td>
<td>-1.25 (0.69)</td>
</tr>
<tr>
<td>Achievement</td>
<td>-0.70 (0.74)</td>
<td>-0.62 (0.67)</td>
<td>-0.76 (0.78)</td>
</tr>
<tr>
<td>Hedonism</td>
<td>0.18 (0.71)</td>
<td>0.13 (0.69)</td>
<td>0.22 (0.73)</td>
</tr>
<tr>
<td>Stimulation</td>
<td>-0.88 (0.81)</td>
<td>-0.74 (0.80)</td>
<td>-1.00 (0.81)</td>
</tr>
<tr>
<td>Self-direction</td>
<td>0.22 (0.66)</td>
<td>0.33 (0.63)</td>
<td>0.14 (0.67)</td>
</tr>
<tr>
<td>Universalism</td>
<td>0.47 (0.54)</td>
<td>0.38 (0.52)</td>
<td>0.55 (0.54)</td>
</tr>
<tr>
<td>Benevolence</td>
<td>0.83 (0.57)</td>
<td>0.66 (0.57)</td>
<td>0.96 (0.54)</td>
</tr>
<tr>
<td>Security</td>
<td>0.67 (0.62)</td>
<td>0.51 (0.58)</td>
<td>0.79 (0.62)</td>
</tr>
<tr>
<td>Tradition</td>
<td>-0.03 (0.83)</td>
<td>0.00 (0.75)</td>
<td>-0.06 (0.88)</td>
</tr>
<tr>
<td>Conformity</td>
<td>0.12 (0.81)</td>
<td>0.10 (0.78)</td>
<td>0.13 (0.84)</td>
</tr>
<tr>
<td>Age at baseline</td>
<td>47.65 (4.42)</td>
<td>47.74 (4.44)</td>
<td>47.58 (4.40)</td>
</tr>
<tr>
<td>University or college education at baseline</td>
<td>637 (47.9)</td>
<td>251 (42.8)</td>
<td>386 (51.9)</td>
</tr>
<tr>
<td>Income per 10,000 NOK in 2007</td>
<td>45.59 (25.27)</td>
<td>56.06 (30.40)</td>
<td>37.35 (16.13)</td>
</tr>
<tr>
<td>Partner in household at baseline</td>
<td>1,090 (82.0)</td>
<td>490 (83.6)</td>
<td>600 (80.6)</td>
</tr>
<tr>
<td>Young children in household at baseline</td>
<td>307 (23.1)</td>
<td>162 (27.6)</td>
<td>145 (19.5)</td>
</tr>
<tr>
<td>Public sector employed at baseline</td>
<td>677 (50.9)</td>
<td>201 (34.3)</td>
<td>476 (64.0)</td>
</tr>
<tr>
<td>Full-time work at baseline</td>
<td>1,106 (83.2)</td>
<td>574 (98.0)</td>
<td>532 (71.5)</td>
</tr>
<tr>
<td>Managerial job at baseline</td>
<td>720 (54.1)</td>
<td>388 (66.2)</td>
<td>332 (44.6)</td>
</tr>
<tr>
<td>Good health at baseline</td>
<td>1,189 (89.4)</td>
<td>510 (90.4)</td>
<td>659 (88.6)</td>
</tr>
</tbody>
</table>
### Table 2

Correlation Matrix for the Independent Study Variables Measured at Baseline

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Power</td>
<td></td>
<td>.42**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Achievement</td>
<td>-.08”</td>
<td></td>
<td>-.08”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Hedonism</td>
<td>.25**</td>
<td>.28**</td>
<td>.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Stimulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Self-direction</td>
<td>.13”</td>
<td>.13”</td>
<td>-.08”</td>
<td>.24**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Universalism</td>
<td>-.45**</td>
<td>-.40”</td>
<td>-.10**</td>
<td>-.22”</td>
<td>-.06’</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Benevolence</td>
<td>-.37”</td>
<td>-.31”</td>
<td>-.02</td>
<td>-.33”</td>
<td>-.16”</td>
<td>.36**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Security</td>
<td>-.31”</td>
<td>-.38”</td>
<td>-.12”</td>
<td>-.47”</td>
<td>.31”</td>
<td>.03</td>
<td>.12”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Tradition</td>
<td>-.35”</td>
<td>-.40”</td>
<td>-.19”</td>
<td>-.44”</td>
<td>-.38”</td>
<td>-.07”</td>
<td>-.06”</td>
<td>.29**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Conformity</td>
<td>-.25”</td>
<td>-.29”</td>
<td>-.32”</td>
<td>-.46”</td>
<td>-.41”</td>
<td>-.10”</td>
<td>-.01</td>
<td>-.27”</td>
<td>.45**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Gender</td>
<td>-.21”</td>
<td>-.09”</td>
<td>.06”</td>
<td>-.16”</td>
<td>-.14”</td>
<td>.15”</td>
<td>.27”</td>
<td>-.22”</td>
<td>-.04</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Age</td>
<td>-.08”</td>
<td>-.02</td>
<td>-.05</td>
<td>-.04</td>
<td>.10”</td>
<td>-.01</td>
<td>.06”</td>
<td>.07”</td>
<td>.01</td>
<td>-.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Education</td>
<td>.12”</td>
<td>.23”</td>
<td>-.09”</td>
<td>.13”</td>
<td>.12”</td>
<td>.10”</td>
<td>-.01</td>
<td>-.13”</td>
<td>-.23”</td>
<td>-.22”</td>
<td>-.09”</td>
<td>-.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Income</td>
<td>.32”</td>
<td>.25”</td>
<td>-.03</td>
<td>.21”</td>
<td>.09”</td>
<td>-.22”</td>
<td>-.20”</td>
<td>-.20”</td>
<td>-.15”</td>
<td>-.10”</td>
<td>-.37”</td>
<td>-.02</td>
<td>.21”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Partner</td>
<td>.06”</td>
<td>-.02</td>
<td>-.04</td>
<td>-.09”</td>
<td>-.08”</td>
<td>.00</td>
<td>-.01</td>
<td>.07”</td>
<td>.03</td>
<td>.08”</td>
<td>-.04</td>
<td>-.05</td>
<td>-.02</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Young children</td>
<td>.10”</td>
<td>.01</td>
<td>-.05</td>
<td>-.01</td>
<td>.01</td>
<td>-.07”</td>
<td>-.02</td>
<td>-.02</td>
<td>.05</td>
<td>-.10”</td>
<td>-.43”</td>
<td>.03</td>
<td>.07”</td>
<td>.17”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Work sector</td>
<td>-.03</td>
<td>.01</td>
<td>-.00</td>
<td>-.03</td>
<td>-.03</td>
<td>.12”</td>
<td>-.08”</td>
<td>.05</td>
<td>-.04</td>
<td>-.08”</td>
<td>.29”</td>
<td>.09”</td>
<td>.26”</td>
<td>-.22”</td>
<td>-.02</td>
<td>-.12”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Full-time work</td>
<td>.18”</td>
<td>.15”</td>
<td>-.00</td>
<td>.19”</td>
<td>.14”</td>
<td>-.07”</td>
<td>-.15”</td>
<td>-.23”</td>
<td>-.11”</td>
<td>-.14”</td>
<td>-.35”</td>
<td>.02</td>
<td>.10”</td>
<td>.34”</td>
<td>-.05</td>
<td>.00</td>
<td>-.10”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 Managerial job</td>
<td>.30”</td>
<td>.16”</td>
<td>-.01</td>
<td>.10”</td>
<td>.09”</td>
<td>-.11”</td>
<td>-.06”</td>
<td>-.15”</td>
<td>-.19”</td>
<td>-.11”</td>
<td>-.22”</td>
<td>-.02</td>
<td>.12”</td>
<td>.31”</td>
<td>.04</td>
<td>.01</td>
<td>-.06”</td>
<td>.24”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 Health</td>
<td>.01</td>
<td>-.01</td>
<td>.01</td>
<td>-.00</td>
<td>.01</td>
<td>.00</td>
<td>.01</td>
<td>-.02</td>
<td>-.00</td>
<td>-.03</td>
<td>-.06”</td>
<td>.11”</td>
<td>.09”</td>
<td>.03</td>
<td>.01</td>
<td>-.00</td>
<td>.06”</td>
<td>.08”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Sick leave 2006†</td>
<td>-.06”</td>
<td>-.03</td>
<td>.01</td>
<td>-.01</td>
<td>.04</td>
<td>-.01</td>
<td>.08”</td>
<td>.04</td>
<td>.02</td>
<td>.03</td>
<td>.12”</td>
<td>.06”</td>
<td>-.06”</td>
<td>-.11”</td>
<td>-.04</td>
<td>-.01</td>
<td>.06”</td>
<td>-.06”</td>
<td>-.05</td>
<td>-.15”</td>
</tr>
</tbody>
</table>

†Register-based sick leave in the year prior to baseline. * p < .05, ** p < .01.
HUMAN VALUES AND SICKNESS ABSENCE

Table 3

Results of Stepwise Linear Regression Analyses with Attitudes towards Sickness Absence at Follow-Up as Dependent Variable

<table>
<thead>
<tr>
<th>Variable at baseline</th>
<th>Step 1</th>
<th></th>
<th>Step 2</th>
<th></th>
<th>Step 3</th>
<th></th>
<th>Step 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>p</td>
<td>Beta</td>
<td>p</td>
<td>Beta</td>
<td>p</td>
<td>Beta</td>
<td>p</td>
</tr>
<tr>
<td>Power</td>
<td>-0.056</td>
<td>.059</td>
<td>-0.041</td>
<td>.181</td>
<td>-0.013</td>
<td>.698</td>
<td>-0.010</td>
<td>.759</td>
</tr>
<tr>
<td>Achievement</td>
<td>-0.010</td>
<td>.735</td>
<td>-0.003</td>
<td>.918</td>
<td>0.019</td>
<td>.546</td>
<td>0.020</td>
<td>.523</td>
</tr>
<tr>
<td>Hedonism</td>
<td>0.029</td>
<td>.326</td>
<td>0.026</td>
<td>.381</td>
<td>0.028</td>
<td>.345</td>
<td>0.027</td>
<td>.372</td>
</tr>
<tr>
<td>Stimulation</td>
<td>0.039</td>
<td>.192</td>
<td>0.053</td>
<td>.080</td>
<td>0.066</td>
<td>.033</td>
<td>0.065</td>
<td>.035</td>
</tr>
<tr>
<td>Self-direction</td>
<td>-0.008</td>
<td>.782</td>
<td>0.005</td>
<td>.879</td>
<td>0.014</td>
<td>.646</td>
<td>0.017</td>
<td>.566</td>
</tr>
<tr>
<td>Universalism</td>
<td>0.024</td>
<td>.421</td>
<td>0.011</td>
<td>.725</td>
<td>-0.002</td>
<td>.953</td>
<td>0.001</td>
<td>.979</td>
</tr>
<tr>
<td>Benevolence</td>
<td>0.032</td>
<td>.276</td>
<td>0.015</td>
<td>.619</td>
<td>0.007</td>
<td>.823</td>
<td>0.003</td>
<td>.935</td>
</tr>
<tr>
<td>Security</td>
<td>-0.048</td>
<td>.109</td>
<td>-0.070</td>
<td>.022</td>
<td>-0.087</td>
<td>.006</td>
<td>-0.087</td>
<td>.005</td>
</tr>
<tr>
<td>Tradition</td>
<td>0.043</td>
<td>.146</td>
<td>0.044</td>
<td>.142</td>
<td>0.022</td>
<td>.474</td>
<td>0.021</td>
<td>.493</td>
</tr>
<tr>
<td>Conformity</td>
<td>-0.054</td>
<td>.070</td>
<td>-0.055</td>
<td>.063</td>
<td>-0.071</td>
<td>.021</td>
<td>-0.073</td>
<td>.017</td>
</tr>
</tbody>
</table>

Note. The steps are adjusted for the following baseline variables: Step 2 – age, gender; Step 3 – additional adjustment for education, income, partner, children, work sector, work time, work position, self-rated health; Step 4 – additional adjustment for register-based sick leave in the year prior to baseline (2006).
HUMAN VALUES AND SICKNESS ABSENCE

Table 4

*Results of Stepwise Binary Logistic Regression Analyses with Self-Reported Sick Leave at Follow-Up as Dependent Variable*

<table>
<thead>
<tr>
<th>Variable at baseline</th>
<th>Step 1</th>
<th></th>
<th>Step 2</th>
<th></th>
<th>Step 3</th>
<th></th>
<th>Step 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR [95% CI]</td>
<td>p</td>
<td>OR [95% CI]</td>
<td>p</td>
<td>OR [95% CI]</td>
<td>p</td>
<td>OR [95% CI]</td>
<td>p</td>
</tr>
<tr>
<td>Power</td>
<td>0.84 [0.72–0.99]</td>
<td>.033</td>
<td>0.91 [0.77–1.06]</td>
<td>.226</td>
<td>0.96 [0.80–1.14]</td>
<td>.633</td>
<td>0.96 [0.81–1.15]</td>
<td>.684</td>
</tr>
<tr>
<td>Achievement</td>
<td>1.23 [1.06–1.43]</td>
<td>.007</td>
<td>1.28 [1.10–1.50]</td>
<td>.002</td>
<td>1.32 [1.12–1.56]</td>
<td>.001</td>
<td>1.33 [1.12–1.57]</td>
<td>.001</td>
</tr>
<tr>
<td>Hedonism</td>
<td>1.03 [0.88–1.20]</td>
<td>.710</td>
<td>1.00 [0.85–1.17]</td>
<td>.967</td>
<td>1.02 [0.87–1.20]</td>
<td>.798</td>
<td>1.02 [0.87–1.20]</td>
<td>.832</td>
</tr>
<tr>
<td>Stimulation</td>
<td>1.01 [0.88–1.16]</td>
<td>.871</td>
<td>1.07 [0.93–1.23]</td>
<td>.367</td>
<td>1.06 [0.91–1.22]</td>
<td>.456</td>
<td>1.05 [0.90–1.21]</td>
<td>.551</td>
</tr>
<tr>
<td>Self-direction</td>
<td>1.14 [0.96–1.35]</td>
<td>.128</td>
<td>1.22 [1.02–1.44]</td>
<td>.026</td>
<td>1.19 [1.00–1.42]</td>
<td>.052</td>
<td>1.22 [1.02–1.46]</td>
<td>.032</td>
</tr>
<tr>
<td>Universalism</td>
<td>1.10 [0.90–1.35]</td>
<td>.353</td>
<td>1.04 [0.84–1.28]</td>
<td>.737</td>
<td>0.94 [0.75–1.17]</td>
<td>.558</td>
<td>0.96 [0.77–1.19]</td>
<td>.689</td>
</tr>
<tr>
<td>Benevolence</td>
<td>1.06 [0.87–1.28]</td>
<td>.563</td>
<td>0.92 [0.75–1.12]</td>
<td>.389</td>
<td>0.88 [0.72–1.09]</td>
<td>.234</td>
<td>0.86 [0.70–1.06]</td>
<td>.166</td>
</tr>
<tr>
<td>Security</td>
<td>0.97 [0.81–1.16]</td>
<td>.725</td>
<td>0.87 [0.72–1.05]</td>
<td>.148</td>
<td>0.87 [0.72–1.06]</td>
<td>.171</td>
<td>0.87 [0.72–1.06]</td>
<td>.173</td>
</tr>
<tr>
<td>Tradition</td>
<td>0.90 [0.78–1.02]</td>
<td>.087</td>
<td>0.91 [0.79–1.04]</td>
<td>.161</td>
<td>0.89 [0.77–1.03]</td>
<td>.123</td>
<td>0.89 [0.77–1.03]</td>
<td>.120</td>
</tr>
<tr>
<td>Conformity</td>
<td>0.89 [0.78–1.02]</td>
<td>.103</td>
<td>0.89 [0.77–1.02]</td>
<td>.082</td>
<td>0.92 [0.80–1.06]</td>
<td>.253</td>
<td>0.91 [0.79–1.06]</td>
<td>.224</td>
</tr>
</tbody>
</table>

*Note.* The steps are adjusted for the following baseline variables: Step 2 – age, gender; Step 3 – additional adjustment for education, income, partner, children, work sector, work time, work position, self-rated health; Step 4 – additional adjustment for register-based sick leave in the year prior to baseline (2006).
HUMAN VALUES AND SICKNESS ABSENCE

Table 5

Results of Stepwise Binary Logistic Regression Analyses with Register-Based Sick Leave between Baseline and Follow-Up (2008–2016) as Dependent Variable

<table>
<thead>
<tr>
<th>Variable at baseline</th>
<th>Step 1 OR [95% CI]</th>
<th>p</th>
<th>Step 2 OR [95% CI]</th>
<th>p</th>
<th>Step 3 OR [95% CI]</th>
<th>p</th>
<th>Step 4 OR [95% CI]</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>0.80 [0.68–0.94]</td>
<td>.006</td>
<td>0.91 [0.77–1.07]</td>
<td>.237</td>
<td>0.98 [0.82–1.18]</td>
<td>.846</td>
<td>0.98 [0.83–1.20]</td>
<td>.983</td>
</tr>
<tr>
<td>Achievement</td>
<td>0.94 [0.80–1.09]</td>
<td>.390</td>
<td>0.99 [0.84–1.15]</td>
<td>.857</td>
<td>1.09 [0.92–1.29]</td>
<td>.333</td>
<td>1.10 [0.92–1.30]</td>
<td>.295</td>
</tr>
<tr>
<td>Hedonism</td>
<td>1.08 [0.92–1.26]</td>
<td>.364</td>
<td>1.05 [0.89–1.23]</td>
<td>.576</td>
<td>1.04 [0.88–1.23]</td>
<td>.651</td>
<td>1.03 [0.87–1.22]</td>
<td>.701</td>
</tr>
<tr>
<td>Stimulation</td>
<td>0.91 [0.79–1.04]</td>
<td>.172</td>
<td>0.99 [0.85–1.14]</td>
<td>.837</td>
<td>1.04 [0.90–1.21]</td>
<td>.592</td>
<td>1.03 [0.88–1.20]</td>
<td>.733</td>
</tr>
<tr>
<td>Self-direction</td>
<td>0.83 [0.70–0.99]</td>
<td>.035</td>
<td>0.91 [0.76–1.08]</td>
<td>.278</td>
<td>0.93 [0.78–1.12]</td>
<td>.455</td>
<td>0.96 [0.80–1.15]</td>
<td>.641</td>
</tr>
<tr>
<td>Universalism</td>
<td>1.07 [0.87–1.31]</td>
<td>.544</td>
<td>0.93 [0.75–1.16]</td>
<td>.529</td>
<td>0.91 [0.72–1.14]</td>
<td>.395</td>
<td>0.93 [0.73–1.17]</td>
<td>.511</td>
</tr>
<tr>
<td>Benevolence</td>
<td>1.40 [1.15–1.71]</td>
<td>.001</td>
<td>1.17 [0.95–1.44]</td>
<td>.133</td>
<td>1.13 [0.91–1.40]</td>
<td>.258</td>
<td>1.09 [0.88–1.35]</td>
<td>.435</td>
</tr>
<tr>
<td>Security</td>
<td>1.22 [1.01–1.46]</td>
<td>.036</td>
<td>1.05 [0.87–1.27]</td>
<td>.626</td>
<td>0.99 [0.81–1.20]</td>
<td>.880</td>
<td>0.99 [0.81–1.21]</td>
<td>.899</td>
</tr>
<tr>
<td>Tradition</td>
<td>1.00 [0.87–1.14]</td>
<td>.960</td>
<td>1.01 [0.88–1.16]</td>
<td>.885</td>
<td>0.93 [0.80–1.08]</td>
<td>.320</td>
<td>0.92 [0.79–1.07]</td>
<td>.289</td>
</tr>
<tr>
<td>Conformity</td>
<td>1.07 [0.93–1.23]</td>
<td>.330</td>
<td>1.06 [0.92–1.22]</td>
<td>.398</td>
<td>1.01 [0.87–1.17]</td>
<td>.900</td>
<td>1.00 [0.86–1.17]</td>
<td>.966</td>
</tr>
</tbody>
</table>

Note. The steps are adjusted for the following baseline variables: Step 2 – age, gender; Step 3 – additional adjustment for education, income, partner, children, work sector, work time, work position, self-rated health; Step 4 – additional adjustment for register-based sick leave in the year prior to baseline (2006).
Appendix 1

An Overview of the 8 Items Measuring Attitudes Towards Sick Leave in NorLAG

“For how long do you think it is acceptable to be on sick leave for the following reasons …”

Family-related reasons

“… caring for or nursing close family members”
“… difficulties related to marital breakdown”
“… grief related to death in the immediate family”
“… attending a sick child when ‘sick child days’ are used up”

Work-related reasons

“… great pressure or stress at work”
“… feeling tired or exhausted”*

Illness-related reasons

“… a common cold with mild fever”
“… having the flu or the like”

*The item might give associations to a strenuous work situation, but may equally be seen in connection with a demanding family situation and/or to incipient illness or to other reasons.
### Appendix 2

*An Overview of the 21-Item Human Values Scale in NorLAG*

<table>
<thead>
<tr>
<th>Core Values Category</th>
<th>Values</th>
</tr>
</thead>
</table>
| **Self-transcendence core values** | **UNIVERSALISM** (α = .62): that people are treated equally and to protect the weak in society; to listen and understand people different from oneself; to care for nature and looking after the environment  
**BENEVOLENCE** (α = .68): to help people and care for others well-being; to be loyal and devoted to friends |
| **Self-enhancement core values** | **POWER** (α = .39): to have a lot of money and expensive things; to be in charge and tell others what to do  
**ACHIEVEMENT** (α = .55): to show own abilities and be admired; to be successful |
|                      | **Openness to change core values/Self-enhancement core values**  
**HEDONISM** (α = .67): to have a good time and fun; to enjoy life’s pleasures and to “spoil” oneself |
|                      | **Conservation core values**  
**SECURITY** (α = .46): to live in secure and safe surroundings; that things be organised and clean  
**TRADITION** (α = .37): to be humble and modest, and not draw attention to oneself; to follow traditions and customs one has learned  
**CONFORMITY** (α = .64): that people do what they’re told and follow rules; to behave properly and reasonably |
|                      | **Openness to change core values**  
**SELF-DIRECTION** (α = .36): to think up new ideas and being creative in an own original way; to make own decisions and be free to plan and choose activities in life  
**STIMULATION** (α = .70): to try lots of new and different things in life; to have an adventurous life and take risks |

*This item was taken from the PVQ scale (Schwartz et al., 2001) and replaced the item “It is important to him/her that the government ensures his/her safety against all threats. He/she wants the state to be strong so it can defend its citizens” that was used in the ESS version of the scale.*
Gender equality in sickness absence tolerance: Attitudes and norms of sickness absence are not different for men and women

Gøril Kvamme Leset¹*, Harald Dale-Olsen², Tale Hellevik¹, Arne Mastekaasa³, Tilmann von Soest⁴, Kjersti Misje Østbakken²

¹ Norwegian Social Research (NOVA), Centre for Welfare and Labour Research, OsloMet–Oslo Metropolitan University, Oslo, Norway, ² Institute for Social Research, Oslo, Norway, ³ Department of Sociology and Human Geography, Faculty of Social Sciences, University of Oslo, Oslo, Norway, ⁴ Department of Psychology, Faculty of Social Sciences, University of Oslo, Oslo, Norway

These authors contributed equally to this work.

* gklos@oslomet.no

Abstract

Previous research offers limited understanding as to why sickness absence is higher among women than among men, but attitudes and norms have been suggested as plausible explanations of this gender gap. The purpose of the present study is to examine whether the gender gap in sickness absence reflects gender differences in sickness absence attitudes or gendered norms of sickness absence in society. The analyses are based on data from a factorial survey experiment covering 1,800 male and female employed respondents in Norway in 2016. Each participant was asked to evaluate whether sick leave would be reasonable in six unique, hypothetical sickness absence scenarios (i.e. vignettes) in which occupation, gender and reason for sick leave varied. Sick leave judgments were regressed on respondent gender and vignette gender using binary logistic regressions across three cut points. Overall, we did not find a substantial gender difference in either attitudes towards sickness absence or sickness absence norms. However, further analyses indicated more tolerant social norms of sickness absence for employees in gender-dominated occupations than for employees in gender-integrated occupations. This pattern could be a result of the type of work attributed to these occupations rather than their gender composition. Contrary to popular belief, we conclude that widely held attitudes and norms of sickness absence are unlikely to be drivers of the gender gap in sickness absence. The results can be useful for policies and interventions aimed at safeguarding gender equality in the labour market.

Introduction

Research has repeatedly shown substantial gender gaps in sickness absence from work. For example, findings from a study examining 17 European countries showed higher sickness absence among women in all countries. Women had, on average, more than a 30% higher probability of being absent from work because of health complaints in any given week than men [1]. Similar differences are found in the US [2] and Canada [3]. Hence, the difference in
sickness absence between men and women exists across different political regimes, social security systems and sick-pay policies [1,4]. Despite decades of research attempting to explain this gender difference, the phenomenon is not fully understood [5,6]. Knowledge about reasons for the higher prevalence of absence among women than men is important, as sickness absence is considered a substantial expense in Western economies [7]. Moreover, the gender gap in sickness absence could also constitute a barrier for women in the labour market [8].

Past studies on gender differences in sickness absence have mainly focused on factors that may cause women to have more health problems or be more susceptible to illness than men, and health issues related to pregnancy do indeed seem to account for part of the gender gap [8,9]. However, other health-related explanations have received limited empirical support, with neither heavier work/family loads among women than among men [10,11] nor differing work conditions for women and men appearing to be of major importance for the gender difference [12,13]. Thus, the gender gap in sickness absence remains largely unexplained [2,6].

The limited understanding of the gender difference in sickness absence warrants closer examination of motivational and attitudinal factors, which have so far received less attention as an explanation for this gender difference. A medical condition could make it impossible to attend work, yet, more typically, the individual has some degree of choice [14]. Studies show that tolerant attitudes towards work absence are actually related to higher likelihood of absenteeism the previous year [15] and number of absence days from work the previous six months [16,17]. Sickness absence without certification from a physician (self-certified sickness absence) is considered more sensitive to individual motivation, and less determined by health status, than is physician-certified sickness absence [18]. Still, even physician-certified sickness absence seems to be in part a matter of subjective decision-making, both by the patient and by the physician [19,20]. A Norwegian study also shows that in the large majority of cases, if a patient asks for sick leave, the physician will grant it [21].

Although the role of attitudinal factors in sickness absence behaviour is quite well established, such factors may not be relevant for explaining specifically the gender differences in this behaviour. A medical condition could make it impossible to attend work, yet, more typically, the individual has some degree of choice [14]. Studies show that tolerant attitudes towards work absence are actually related to higher likelihood of absenteeism the previous year [15] and number of absence days from work the previous six months [16,17]. Sickness absence without certification from a physician (self-certified sickness absence) is considered more sensitive to individual motivation, and less determined by health status, than is physician-certified sickness absence [18]. Still, even physician-certified sickness absence seems to be in part a matter of subjective decision-making, both by the patient and by the physician [19,20]. A Norwegian study also shows that in the large majority of cases, if a patient asks for sick leave, the physician will grant it [21].

The gender difference in sickness absence is similar to gender differences in other illness behaviours, such as help-seeking and use of medical services [22–24]. A better understanding of the role of attitudes and norms in connection with sickness absence may thus also contribute to our understanding of the broader issue of gender differences in illness behaviour. From an applied point of view, an improved comprehension of the mechanisms behind the gender gap in sickness absence may be informative for policies and interventions aimed at safeguarding gender equality in the labour market and reducing sickness absence.

**Gender differences in sickness absence attitudes and norms**

Attitudes towards sickness absence might differ between men and women because widely held gender stereotypes in society shape different expectations of when sickness absence is
acceptable and when it is not [2]. For example, traditional female stereotypes of being weak and
dependent [25,26] may legitimize sickness absence for women to a larger degree than for men,
while traditional male role characteristics, such as competitiveness and independence [25,26],
may make men less prone to accept sickness absence. Moreover, by virtue of their typical role as
primary caregivers, women may be more motivated than men by the concern that a health
problem threatens the fulfillment of caregiving duties. Such concerns may also make sickness
absence more legitimate for women than men. A previous study suggests that controlled for
gender, high levels of stereotypical male traits are related to reduced sickness absence risk,
whereas stereotypical female traits tend to be associated with increased sickness absence risk
[27]. The societal expectations and the practices of typical female role characteristics are also
argued to be more health oriented than typical male characteristics [28]. Thus, there are several
reasons to believe that there may be gender differences in sickness absence norms.

When considering research on attitudes towards work absence in general (without a spe-
cific focus on sickness-related absence), two previous studies suggest that women view absence
from work as more legitimate than men do. The first study was based on survey data from 444
Canadian business school graduates [16], while the second study comprised cross-cultural sur-
vey data from 1,535 respondents distributed in nine nations [17]. The two studies used the
same scale to assess the respondents’ general perception of absenteeism as a legitimate work
behaviour with some of the items tapping into the view of absence as inevitable, understand-
able and punishable. Both studies found women to be more forgiving of work absence than
men. Yet, when reasons for work absence were stated, women and men did not differ in work
absence tolerance [17].

We identified two studies that examined social acceptability of sickness absence for women
New York Times over a 100-year period and concluded that gendered work absence norms do
exist on a societal level. More specifically, the study indicated higher acceptance of sickness
absence for women than for men based on general stereotypes related to women’s double
workload of domestic duties and paid work, women’s frailer health and women’s lower work
commitment. However, a second study by Patton [29] based on factorial survey data from 454
managers and professionals did not find differences in judgments of work absence due to ill-
ness based on absentee gender.

Only one previous study has examined gender differences in leniency towards sickness
absence. By linking survey data from 226 health care workers to employer records on sickness
absence, a Norwegian study found no significant differences between women and men in their
attitudes towards sickness absence [30]. However, the study is limited by examining a rather
specific group of employees in a female dominated profession (health care workers) and by
employing a rather complex measure of attitudes that blends attitudes of shirking from work
with attitudes towards more legitimate work absence due to sickness. Large scale studies using
a representative sample and providing more detailed information about gender differences by
using well-defined measures of attitudes towards sickness absence are therefore needed.

In conclusion, previous research on gender differences in sickness absence attitudes and
norms is limited and the results are mixed. The few available studies indicate that women may
view sickness-related work absence differently from men and that the social acceptance of sick-
ness absence may differ by gender. Given the large gender gap, we expect more tolerant sick-
ness absence attitudes among women than among men as well as higher social acceptance of
women’s sick leave than men’s:

Hypothesis 1: Women have more tolerant attitudes towards sickness absence than men and
thus judge sickness absence as reasonable more often than men do.
Hypothesis 2: Social norms of sickness absence favour women—that is, both men and women have more tolerant attitudes towards women being absent from work because of sickness than towards men being absent because of sickness.

**Differences in sickness absence norms by occupational gender composition**

Several studies consider occupation to be an integrated component of gender stereotypes and suggest that occupational information evokes associations with gender roles and gender-stereotypical traits of the employee [31–34]. For example, employees in male-dominated occupations are considered to have stronger leadership skills, while employees in female-dominated occupations are viewed as more socially sensitive, regardless of employee gender [33]. People also seem to draw conclusions about a person’s occupation according to gender roles or gender-stereotypical trait information [32,35]. The judgment of an occupation as gender stereotyped is also repeatedly shown to reflect the statistical proportion of men and women in occupations [31,36]. Moreover, cross-national data from 41 countries confirm that the five most female-dominated occupations in the world—which include kindergarten teaching, nursing and secretarial work—typically involve socially sensitive and care-related tasks and are seldom characterised by leadership responsibilities [37].

In sum, the research literature implies that gender-dominated occupations are associated with gender roles and stereotypes. Accordingly, gendered occupations may prompt gender-stereotypical associations that influence the legitimisation of sickness absence. Given previous arguments about how female gender roles seem more compatible with sickness absence than male gender roles, we suggest that sickness absence acceptance may be greater for female-dominated occupations, which are typically associated with female gender roles.

So far, sickness absence norms in relation to gendered occupations have not been tested, but several studies suggest a tendency of higher sickness absence rates in female-dominated occupations or workplaces [38,39]. This tendency could imply that sickness absence norms are more lenient in cases of female-dominated occupations compared to male-dominated or gender-integrated occupations, particularly because past research indicates that female-dominated occupations are not unhealthier than male-dominated occupations are [12,13]. We posit the following hypothesis:

**Hypothesis 3**: Employees face more tolerant social norms of sickness absence in female-dominated than in male-dominated or gender-integrated occupations.

**The national context**

Norway, adhering to the Nordic welfare model, is characterised by high participation of women in education and the workforce, as well as by shared housework and childcare [40,41]. However, despite Norway being a gender-equal welfare state, Norway’s labour market remains remarkably gender segregated and women have substantially higher sickness absence than men [13,41–43]. The gender difference in sickness absence is mainly evident for physician-certified sickness absence. In 2017, women had, on average, 72% higher physician-certified sickness absence than men, compared with 33% higher self-certified sickness absence than men [42,43]. The present study therefore concentrates on the evaluation of longer sickness absences that may qualify for physician-certification.

Norwegian employees may receive sickness absence compensation for up to one year. The employee’s own declaration (self-certification) that the absence is due to sickness is sufficient for the first few days (either three or eight in most firms); for longer absence periods, certification from a physician is required. The level of compensation is 100% up to a ceiling, and the
The generous sick-pay scheme in Norway could provide more opportunities for non-financial factors to affect sickness absence than less favourable sick-pay schemes in other countries, making Norway an interesting case for studying gender differences in sickness absence attitudes and norms. Moreover, due to high levels of sickness absence, the costs of illegitimate absenteeism—i.e., abuse of the generous sick-pay scheme—is more of an expressed concern in Norway than the costs of presenteeism—i.e., employees going to work when sick, infecting colleagues and causing productivity loss.

Methods

To examine whether or not men and women judge sickness absence differently, and whether or not men and women are judged differently when it comes to sickness absence, we conducted a factorial survey experiment in spring 2016, administered by the market research firm Kantar TNS.

Procedure and participants

The study sample was drawn from a general-purpose, web-based panel established and managed by Kantar TNS. The Kantar panel consists of approximately 45,000 participants over the age of 15 who have been recruited to join the panel after participating in surveys conducted by the market research firm. Panel participants are usually invited to partake in one or two surveys a month. Participation in the panel is voluntary, but survey participation earns points that can be converted into selected gift items or gift vouchers, or donated to charity. Upon panel registration, participants provide background information about themselves to facilitate the selection process of participants for future surveys. In the present study, employment was a prerequisite for participation. Accordingly, 26,450 of the panel participants were eligible to partake in the survey.

The study questionnaire was sent by email to a random sample of 3,700 eligible panel participants (stratified by gender). In all, 59% of the invited participants opened the form (n = 2,176). Of these, 66 persons did not complete the form, while 310 persons met a “closed door” (i.e. all vignette alternatives were already answered when they opened the form). This recruitment approach ensured that exactly 1,800 respondents (900 women and 900 men) answered a form. The Data Protection Official for Research at The Norwegian Social Science Data Services approved the study. Moreover, the data file made available to the research group by Kantar TNS was without any kind of personal identifiers, and thus fully anonymous.

The factorial survey approach

The factorial experimental method is particularly suitable for identifying individuals’ decision or evaluation principles [44]. The respondents are presented with descriptions of hypothetical scenarios (so-called vignettes), resembling real-life decision-making situations, and then asked to make a judgment. Across the vignettes, different factors are experimentally varied in order to estimate the impact of these multi-dimensional stimuli on the evaluation of the dependent variable.

In our survey, each vignette describes an employee, either male or female, in a specific occupation and with a specific health issue, and the respondents are asked to judge the reasonableness of sick leave in the situation. More precisely, the respondents are informed that the vignette-person has already been at home for three days of self-certified sickness absence but now thinks they need more time before returning to work. The respondents are then asked whether they think it is reasonable for the vignette-person to receive a physician-certified sick
leave in the situation, with response categories "completely unreasonable" (1), "fairly unreasonable" (2), "fairly reasonable" (3), and "completely reasonable" (4), in addition to "don’t know" (see Appendix for the introductory text and a vignette example).

Our main dimension of interest is gender. In order to ensure that our findings in relation to gender differences (or lack thereof) in attitudes and/or social norms are not limited to a small number of scenarios, we included as many as 90 occupations and 30 diagnoses in the vignettes. To emphasise, we are not interested in the effects of a particular occupation or particular diagnosis, but in the effects of gender across a large number of situations. However, it is possible to combine the occupations and diagnoses into overall dimensions and test the effects of these—for example the importance of gender composition of an occupation. We selected occupations from the Norwegian State Register of Employers and Employees that represented different levels of female-dominated, male-dominated and gender-balanced occupations, as well as high-, middle- and low-status occupations [45]. For the diagnoses we used the Norwegian Labour and Welfare Administration’s statistics to choose examples among the most common diagnostic categories for sickness certification in Norway (i.e. mental illnesses, musculoskeletal disorders, headaches and dizziness, contagious respiratory illnesses and pregnancy complications). We also included some vignettes with examples of work- and family-related socio-psychological problems (i.e. work conflict, care responsibility for family members) instead of medical diagnoses (13% of the total number of vignettes). Vignette diagnoses concerning pregnancy complications were also included in the study design among female vignette-persons (7% of the total number of vignettes), because sickness absence tolerance due to such complications are planned to be examined as part of another publication. These vignettes were excluded from the present study because such vignettes could not be gender balanced.

To avoid the risk of fatigue, boredom or unwanted methodological effects such as response heuristics [44], we decided that each respondent would not have to judge more than six vignettes. With 90 occupations, 30 diagnoses and 2 genders, the total number of possible unique vignettes (the vignette universe) is 5,400 (90 x 30 x 2). Our data set includes all of these vignettes, divided into 900 questionnaires (5,400 / 6 = 900) in the following manner:

- The 2,700 exhaustive combinations of occupation and diagnosis were combined six and six into 450 questionnaires, in such a way that no questionnaire would contain the same diagnosis or the same occupation.

- Three of the vignettes in each questionnaire were randomly assigned female gender and three male gender (except where there was a pregnancy diagnosis included and the vignette person naturally had to be female).

- The order in which the six vignettes (and thus also specific diagnoses, occupations or genders) were presented within the individual questionnaire was random.

- For each of the 450 questionnaires we created a mirror image with reverse gender distribution for the six vignettes.

Each of the 900 unique questionnaire forms was answered by both a female and a male employee, giving us 1,800 respondents and 10,800 vignettes to analyse. The questionnaires were randomly assigned to respondents within the female and male sample. Since the sample of female and male respondents answered the exact same 900 forms, gender differences in sickness absence attitudes could not be influenced by order effects for the vignettes. Similarly, since each questionnaire had a mirror image with reverse gender distribution for the six vignettes, order effects cannot be the explanation for differences relating to gender of the vignette person (and gender differences in social norms). The data are fully available in S1 File.
Statistical analysis

Our four-level dependent variable is most appropriately considered as an ordinal scale, and ordinal logistic regression would seem like a reasonable method. This model assumes, however, that the effect of the explanatory variable is identical irrespective of the cut point (e.g. whether it is set between categories one and two or between categories three and four; the so-called parallel regression or proportional odds assumption). The validity of this assumption can be evaluated by estimating three binary logistic regressions, one for each possible dichotomisation of the four-category variable, and then testing the null hypothesis that each of the coefficients are identical across the three regressions. As shown below, this hypothesis is rejected in the present case, and we therefore present the full set of binary logistic regressions. Since the respondent judges several vignettes, the measurements from each respondent have correlated error terms. Consequently, we employ robust standard errors that take clustering into account [46]. To ensure the experimental condition of the survey (i.e. an equal number of men and women featured in the vignettes), vignettes describing pregnancy-related diagnostic categories (n = 720) are excluded from all analyses.

Results

Descriptive statistics

The final sample consisted of 1,800 gainfully employed respondents, with 50% women (n = 900) and an average age of 47 years (SD = 14; range 18–83). In all, 48.8% of the respondents had college or university education, and 69.1% were living with a partner at the time of the interview. Furthermore, 58.8% of the women and 45.3% of the men reported to have had at least one sickness absence spell during the previous 12 months, yielding a 13.5 percentage-point gender gap in self-reported sickness absence.

The 10,080 vignettes constituted the analytical units in our analyses (sick leave judgments). Overall, respondents were quite accepting of sickness absence in the situations described; on average, 27.6% found sickness absence to be "perfectly reasonable", 40.4% found it "fairly reasonable", 20.8% found it "fairly unreasonable", and only 7.0% answered "perfectly unreasonable". Vignettes with the response "don’t know" constituted 4.2% (n = 428) of the vignettes and were excluded from the regression analyses.

Sick leave judgments varied considerably across vignette occupations; the percentage answering ("perfectly" or "fairly") "reasonable" ranged from 50.0 to 84.8, and the percentage with ("perfectly" or "fairly") "unreasonable" ratings varied from 13.4 to 46.4. Table 1 shows the sick leave judgments of vignette occupation

<table>
<thead>
<tr>
<th>Sick leave judgments of vignette occupation</th>
<th>%</th>
<th>Perfectly or fairly unreasonable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawmill production worker</td>
<td>84.8</td>
<td>Telephone salesperson</td>
</tr>
<tr>
<td>Assistant air traffic controller</td>
<td>80.4</td>
<td>Interpreter</td>
</tr>
<tr>
<td>Plumber</td>
<td>78.6</td>
<td>Accountant</td>
</tr>
<tr>
<td>Truck driver</td>
<td>78.4</td>
<td>Bank customer service representative</td>
</tr>
<tr>
<td>Auxiliary nurse</td>
<td>78.2</td>
<td>Professor</td>
</tr>
<tr>
<td>Nurse</td>
<td>77.7</td>
<td>Head librarian</td>
</tr>
<tr>
<td>Firefighter</td>
<td>75.9</td>
<td>Civil engineer in the oil industry</td>
</tr>
<tr>
<td>Kitchen help</td>
<td>75.9</td>
<td>Journalist</td>
</tr>
<tr>
<td>Hospital doctor</td>
<td>75.7</td>
<td>Gardener</td>
</tr>
<tr>
<td>Scaffold builder</td>
<td>75.5</td>
<td>Administrative officer</td>
</tr>
</tbody>
</table>

https://doi.org/10.1371/journal.pone.0200788.t001
ten occupations with highest “reasonable” ratings and the ten occupations with highest “unreasonable” ratings. The list of occupations with high acceptance of sickness absence included health-related work (nurse, hospital doctor) as well as other occupations where mistakes might have fatal consequences (truck driver, air traffic controller) and which involve potentially heavy manual work (sawmill production worker, firefighter). The list of occupations with low acceptance of sickness absence included typical office work, but also jobs with extensive customer contact (interpreter, bank customer service representative).

Gender differences in sick leave judgments

Turning to gender comparisons, Fig 1 shows the distribution of sick leave judgments by respondent gender. As displayed, men’s and women’s ratings were very similar, but there seemed to be a small tendency for men’s ratings to be more polarised than women’s, particularly regarding the “perfectly unreasonable” category. Women also came across as slightly more indecisive in their sick leave judgments than men were, illustrated by a 1.3 percentage-point gender difference in “don’t know” responses. Fig 2 presents the distribution of sick leave judgments by male and female vignette person. As shown, the respondents’ sick leave judgments were even more similar between male and female vignettes, indicating that sick leave judgments did not depend on vignette gender.

We tested hypotheses 1 and 2 by regressing sick leave judgments simultaneously on respondent gender and vignette gender. When conducting separate analyses for the three possible cut points on the vignette responses to test the proportional odds assumption of the ordinal logistic model (Table 2), this assumption was clearly rejected ($\chi^2 = 18.56, df = 4, p = .001$). In the following, we therefore present results from binary logistic regressions for each cut point.

As shown in Table 2, only one cut-point analysis yielded a significant gender difference. Women had, compared to men, 39% higher odds of rating the vignettes as “fairly unreasonable”, “fairly reasonable” or “perfectly reasonable” than “perfectly unreasonable” (Responses 2–4 versus Response 1) than men ($p < .01$). This finding confirms the observation from Fig 1 suggesting that female respondents were less likely to use the “perfectly unreasonable” category, thereby displaying slightly more tolerant or less strict attitudes towards sickness absence.

![Fig 1. Distribution of sick leave judgments by respondent gender (%).](https://doi.org/10.1371/journal.pone.0200788.g001)
than male respondents. However, this result is only partly supporting Hypothesis 1. When examining the effects of vignette gender, none of the results across all three cut points on the dependent variable revealed a significant difference in sick leave judgments according to vignette gender (p > .05). The results substantiate the similarities in judgments observed in Fig 2; thus, Hypothesis 2 was not supported. Adding an interaction term of the respondents’ gender and the vignettes’ gender (Model 2) did not reveal a gender difference in the likelihood of judging sickness absence differently depending on the vignette gender at any cut point (p > .05).

Table 2. Logistic regression results with sick leave judgments regressed on respondent gender and vignette gender, with and without an interaction term. Separate analyses for alternative cut points on the dependent variable.

<table>
<thead>
<tr>
<th></th>
<th>Responses 2–4 vs. Response 1</th>
<th>Responses 3–4 vs. Responses 1–2</th>
<th>Response 4 vs. Responses 1–3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondent gender</td>
<td>1.39** (1.14–1.70)</td>
<td>1.04 (0.93–1.17)</td>
<td>0.93 (0.81–1.07)</td>
</tr>
<tr>
<td>Vignette gender</td>
<td>1.13 (0.98–1.31)</td>
<td>1.00 (0.92–1.08)</td>
<td>1.01 (0.94–1.09)</td>
</tr>
<tr>
<td>Constant</td>
<td>10.27** (8.87–11.89)</td>
<td>2.40** (2.19–2.64)</td>
<td>0.42** (0.37–0.46)</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondent gender</td>
<td>1.40** (1.10–1.78)</td>
<td>1.08 (0.94–1.25)</td>
<td>0.96 (0.82–1.13)</td>
</tr>
<tr>
<td>Vignette gender</td>
<td>1.14 (0.94–1.38)</td>
<td>1.04 (0.93–1.15)</td>
<td>1.05 (0.95–1.16)</td>
</tr>
<tr>
<td>Resp. gender x Vign. gender</td>
<td>0.99 (0.74–1.32)</td>
<td>0.93 (0.79–1.09)</td>
<td>0.93 (0.80–1.09)</td>
</tr>
<tr>
<td>Constant</td>
<td>10.25** (8.75–11.99)</td>
<td>2.36** (2.14–2.60)</td>
<td>0.41** (0.37–0.46)</td>
</tr>
</tbody>
</table>

Response 1 = "perfectly unreasonable"; Response 2 = "fairly unreasonable"; Response 3 = "fairly reasonable"; Response 4 = "perfectly reasonable". Vignettes with pregnancy-related diagnoses and "don't know" responses are excluded. Number of vignettes: 9,652; number of respondents: 1,790. Gender is coded as male = 0 and female = 1.

* p < .05
** p < .01.
We also conducted additional age-stratified analyses to examine whether sick leave judgments varied across different age groups. For this purpose, we included two dummy variables in the regression equation to contrast the age groups 35–60 and 61–83 years, respectively, with the youngest participants (age 18–34 years). Moreover, we included interaction terms of both age group indicators with both respondent gender and vignette gender, and tested the null hypothesis that all coefficients for the interaction terms were jointly zero (i.e. that all gender coefficients were identical across age groups). This was done separately for each of the three cut-point specific regressions. The results showed that the null hypothesis could not be rejected (Responses 2–4 vs. Response 1: $\chi^2 = 6.73, df = 4, p = 0.151$; Responses 1–2 vs. Responses 3–4: $\chi^2 = 0.88, df = 4, p = 0.928$; Response 4 vs. Responses 1–3: $\chi^2 = 2.95, df = 4, p = 0.566$).

Hypothesis 3 was tested by conducting binary logistic regression analyses of sick leave judgments on the proportion of women in the vignette occupation, with control for respondent gender and vignette gender. As shown in Table 3, all three separate analyses for alternative cut points on sick leave judgments showed a negative relationship between proportion of women in the vignette occupation and favourable judgments. However, to consider non-linearity, a squared term of the proportion of women in the vignette occupation was also included in the analyses. The results suggest a U-shaped relationship between more favourable sick leave judgments and the proportion of women in the vignette occupations for all three cut-point analyses. Fig 3 illustrates this finding by the plotting of probabilities for one of the cut points: “perfectly reasonable” as a function of the proportion of women in the occupation. As shown, both male-dominated and female-dominated occupations evoked a higher likelihood for lenient sick leave judgments than gender-integrated occupations, irrespective of vignette gender. The plot also suggests that employees in fully gender-integrated occupations are judged in the least lenient manner and employees in fully gender-dominated occupations are judged in the most lenient manner. Hence, these findings only partially support Hypothesis 3, because employees in both male- and female-dominated occupations seem to be judged in a similarly favourable manner compared to employees in gender-integrated occupations. Finally, we rerun all analyses without including the 1,440 vignettes that did not strictly concern medical diagnoses (i.e. work- and family-related socio-psychological problems), but these analyses did not change the study results considerably.

Table 3. Logistic regression results with sick leave judgments regressed on respondent gender, vignette gender and proportion of women in the vignette occupation. Separate analyses for alternative cut points on the dependent variable.

<table>
<thead>
<tr>
<th>Response 2–4 vs. Response 1</th>
<th>Response 3–4 vs. Responses 1–2</th>
<th>Response 4 vs. Responses 1–3</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Respondent gender</td>
<td>1.39* (1.14–1.70)</td>
<td>1.04 (0.93–1.17)</td>
</tr>
<tr>
<td>Vignette gender</td>
<td>1.14 (0.98–1.31)</td>
<td>1.00 (0.92–1.08)</td>
</tr>
<tr>
<td>Prop. women</td>
<td>0.35* (0.13–0.92)</td>
<td>0.25* (0.14–0.43)</td>
</tr>
<tr>
<td>Prop. women squared</td>
<td>2.57* (1.01–6.52)</td>
<td>3.53** (2.07–6.01)</td>
</tr>
<tr>
<td>Constant</td>
<td>12.60** (9.81–16.17)</td>
<td>3.16* (2.73–3.66)</td>
</tr>
</tbody>
</table>

Response 1 = “perfectly unreasonable”; Response 2 = “fairly unreasonable”; Response 3 = “fairly reasonable”; Response 4 = “perfectly reasonable”. Vignettes with pregnancy-related diagnoses and “don’t know” responses are excluded. Number of vignettes: 9,652; number of respondents: 1,790. Gender is coded as male = 0 and female = 1.

*p < .05
**p < .01

https://doi.org/10.1371/journal.pone.0200788.t003
Discussion

The main purpose of this study was to examine potential gender differences in attitudes and norms of sickness absence. Altogether, the analyses did not support such differences. Overall, women and men judged sickness absence similarly, even though one of the analyses suggested that women consider sickness absence as "perfectly unreasonable" less frequently than men. Furthermore, we did not find evidence of sickness absence norms favouring women—that is, men and women were not judged differently when absent because of sickness. However, the occupational gender composition was associated with the respondents' sick leave judgments, suggesting that, regardless of gender, employees in both male- and female-dominated occupations faced more tolerant norms of sickness absence than employees in gender-integrated occupations.

Strengths and limitations

Since few gender differences were found in the present study, we must discuss whether limitations of the study design could have contributed to the lack of association. One limitation is that the study sample comprises individuals who are willing to participate in surveys on a regular basis and thus may not be representative of the general Norwegian population. Nevertheless, there is no obvious reason why people who frequently participate in surveys, or who in other ways do not perfectly reflect the average Norwegian, should have either stronger or weaker gender-biased attitudes concerning sickness absence legitimacy.

Another limitation is that attitudes (and norms) are hypothetical constructs that are difficult to measure [47]. Although the elaborated situational descriptions in survey vignettes improves the possibilities of stimuli standardisation (i.e. less abstract, vague and indirect questioning) and reduces the likelihood of responses being influenced by social desirability bias.
compared to traditional survey questions [44,48], it is not a given that respondents’ judgments are generalisable to real life. On the one hand, the scenarios could have been too specific, thereby restricting the influence of gender norms on sick leave judgments. For example, with scenarios that only indicate a diagnosis (i.e. that lack symptom description), there might be more leeway for judgments to be influenced by gender differences in health focus and the challenges that a health problem may cause. On the other hand, one might also argue that the scenarios were not specific enough—simply describing sick leave scenarios is not sufficiently specific to reflect the actual norms that individuals face in real-life situations, potentially weakening the effect of societal sickness-absence expectations on respondents’ judgments. Still, our careful efforts to create sick leave scenarios that represent the most common diagnostic categories for sickness certification, a wide range of occupations and our experimental condition should strengthen the credibility of the scenarios and the generalisability of judgments. In this respect, the data set is also uniquely comprehensive and innovative compared to previous studies in the field. We also acknowledge the possibility of complex interplays between personal characteristics not assessed in this study and vignette characteristics. For example, the relationship between vignette occupation and sick leave judgments may vary according to respondents’ own occupation. However, respondents’ occupation was not assessed in the present study.

A further limitation is that the analyses are restricted to the Norwegian labour market. This is not an obvious explanation for our findings, however, since gender differences in sickness absence are greater in Norway than in most other countries. Nevertheless, only future research can provide information on whether our findings are generalisable to other samples and countries with different sick leave policies and labour market characteristics.

Equally tolerant sickness absence attitudes among women and men

Our first hypothesis predicting that women judge sickness absence as reasonable more often than men was not supported overall. Although one of the analyses suggests that women are slightly less likely to exclude completely the legitimacy of sickness absence in some instances, we cannot conclude that women generally have more tolerant attitudes than men. Therefore, our results imply that women and men actually judge sickness absence similarly. The results are partly in disagreement with those of two previous studies that used the same measure of work absence legitimacy and showed that women generally had a broader tolerance of absence from work than men [16,17]. However, the measure applied in these two studies did not include attitudes towards different reasons for work absence. Nonetheless, when Addae and colleagues [17] additionally measured views of absence legitimacy using work absence scenarios that also stated reason for work absence, men and women, in line with our results, did not differ in work absence tolerance. Still, illness was not included as a reason for work absence in their scenarios. The present study is therefore the first to measure gender differences in sickness absence attitudes using sickness absence scenarios and a comprehensive population-based sample. Thus, the present study provides solid support for the notion that gender differences in sickness absence attitudes are small and may therefore be of minor importance in explaining the gender gap in sickness absence.

Women and men face similar sickness absence norms

Our second hypothesis postulated that people have more tolerant attitudes to women’s sickness absence than to men’s. As no difference in the evaluation of men’s and women’s sickness absence was found, this hypothesis was not supported either. The results correspond to those of Patton [29], which also found no differences in judgments of work absence based on
absentee gender in an American study sample. However, the present study results seem to diverge from those of another American study that examined gendered work absence norms. From their analysis of newspaper content, Patton and Johns [2] concluded that work absence norms are legitimising work absence for women because of common stereotypes such as women’s weaker health and greater loads of domestic and paid work compared to men. The different result may reflect temporal differences as Patton and Johns’ analyses covered a long historical period and only six observations (newspaper articles) were post-year 2000. In addition, the methodological differences are substantial because, while we measured attitudes and norms as they may affect the behaviour of specific individuals in concrete situations, Patton and Johns dealt with more general ideas and attitudes found in the public discourse.

Favourable sickness absence norms for gender-dominated occupations
The third hypothesis, predicting that employees face more tolerant norms of sickness absence in female-dominated occupations than in male-dominated or gender-integrated occupations was partly supported in the present study. Our findings are consistent with the idea that sickness absence norms are “gendered”, but only if this means that sickness absence norms are more lenient in both female- and male-dominated occupations than in gender-integrated occupations. The similarity in judgments between male- and female-dominated occupations, irrespective of employee gender, implies that we cannot conclude that favourable sickness absence norms for gender-dominated occupations are influenced by gender stereotypes or their gender balance per se.

The U-shaped association between sick leave judgments and occupational gender composition corresponds with studies showing that sickness absence rates are higher in both strongly male- and strongly female-dominated occupations than in gender-integrated occupations [1,49]. Sickness absence rates also seem to decrease with higher job level (i.e. level of autonomy and authority in the job) for both men and women in gender-dominated occupations, while this pattern is less obvious in gender-integrated occupations [50]. Higher sickness absence rates in strongly gender-dominated occupations may partly reflect their generally greater incompatibility with performing work tasks while having a health issue compared to gender-integrated occupations. Likewise, more lenient sick leave judgments for highly gender-dominated occupations in the present study could be the result of the type of job tasks that respondents associate with these occupations. In other words, the typically heavier manual work and less autonomy and flexibility of these occupations might be judged as more compatible with sickness absenteeism and less compatible with sickness presenteeism than more gender-integrated occupations such as office or managerial positions.

General discussion
In view of the substantial gender gap in sickness absence and the common notion that women typically deal with double workloads of domestic and paid work, it is surprising that sickness absence norms do not seem to favour women at all. As noted above, there is also a widespread assumption in broader research on illness behaviour that gender differences in such behaviours are to a considerable extent an outcome of gendered attitudes and norms [28,51]. Nevertheless, not all research on illness behaviour supports this idea. For instance, Hunt and colleagues [52] found that among those known to have either headache or back pain symptoms, only small if any gender difference in consultations was found. One interpretation of this finding is that men and women differ primarily in their propensity to define, or not to define, something as a health problem; if a condition is defined as a health issue, the norms and attitudes may be similar for men and women.
A further possibility is that norms and attitudes have changed over time. Although gender stereotypes might generally not have kept up with the rapid increase of women in the workforce in recent decades, the increasing gender equality in workforce participation may have contributed to men and women having similar sickness absence attitudes today. Additionally, studies suggest that women overall do not have a lower commitment to work or lower work ethic than men [53,54], which may also explain the lack of gendered sickness absence attitudes in the present study. Moreover, the marked focus on the gender gap in the Norwegian public discourse over the last two decades might have altered sickness absence norms, resulting in lower tolerance for female sickness absence in later years, thereby cancelling any prior gender difference in such norms.

Future studies may profit from exploring whether gendered attitudes and norms of sickness absence exist in crucial groups. For example, stricter guidelines for physicians certifying sick leave are related to reduced sickness absence [19]; thus, general practitioners have a participatory role in the sickness absence rate and could possibly contribute to the gender gap in sickness absence. Also, factorial surveys examining sickness absence attitudes in other samples and countries are needed to establish the generalisability of the study results.

The limited understanding of the gender gap could be problematic. The higher sickness absenteeism among women may result in gender discrimination in the workplace and in employers’ hiring practices, since such absence is often associated with increased costs and work disruption [55]. Sickness absence is also linked to reduced income and career opportunities and to disability and unemployment for the individual [56,57]. We consider the lack of gendered attitudes and norms of sickness absence found in the present study to be an important contribution to the field. Notably, our study does not support the popular belief that women have higher sickness absence than men because of commonly gendered attitudes and norms in society. Hence, the study results do not indicate that low work engagement and work morale among women explain the gender gap in sickness absence.

Conclusions
Insufficient explanations for the gender gap in sickness absence has raised speculation that gendered attitudes or norms promote female sickness absence. The higher sickness absence among women than among men, and speculation as to what is causing this gender gap, could harm gender equality in the labour market. It is therefore in the interests of society to explain the mechanisms underlying the gender difference in sickness absence. Moreover, knowledge about factors that may cause sickness absence might prove useful for reducing sickness absence rates for both men and women. The present study results suggest that societal attitudes and norms of sickness absence are unlikely to be important factors driving the gender gap. Accordingly, the results are informative for policies and interventions aimed at reducing the gender gap in sickness absence, since poor work morale or work engagement do not seem to shed light on the gender gap. Future research may benefit from examining whether similar results will be obtained in other countries with varying levels of gender equality in the labour force. Moreover, research on whether gendered norms of sickness absence exist in important groups of societal interest, such as among physicians who certify sick leave, may provide a better understanding of potential sources of gender differences in sickness absence.

Appendix
Introductory text for the vignettes
The respondents were met with the following introductory text before being presented the six vignettes:
In this survey, we want to know what you think is a reasonable cause for sick leave. We describe six different situations, in which a person has been home for three days of self-certified sick leave, but where the person thinks he/she needs more time before he/she returns to work. We ask you to evaluate, for each situation, whether you think it is reasonable that the person receives a physician-certified sick leave in this situation.

Vignette example
A full vignette example is displayed below:

Frank works as a scaffold builder. He is afflicted by a stiff and painful neck and pain in both shoulders. The pain is not very strong, but present as a more or less constant ache. He notices a tendency of improvement when he can take it easy, while the pain is aggravated by stress. Frank has been at home for three days of self-certified sickness absence, but thinks that he needs more time before he returns to work. How reasonable or unreasonable do you think it is that Frank receives a physician-certified sick leave in this situation?

Each vignette was rated by four graded response categories; “perfectly unreasonable” (1), “fairly unreasonable” (2), “fairly reasonable” (3), and “perfectly reasonable” (4), in addition to “don’t know” (5).

Supporting information
S1 File. Full vignette dataset.xlsx. The file contains an Excel sheet with data tabulated under the tabs: “Data on the vignette level” and “Variable names and labels”. All 10,800 vignettes are included in this file.

Acknowledgments
Thanks to colleagues Marijke Veenstra and Niklas Jakobsson, both at Norwegian Social Research (NOVA), OsloMet–Oslo Metropolitan University, for valuable input and support in the initial phase of the study.

Author Contributions

Data curation: Gøril Kvamme Løset, Tale Hellevik.

Formal analysis: Gøril Kvamme Løset, Arne Mastekaasa.

Funding acquisition: Tale Hellevik.


Project administration: Gøril Kvamme Løset, Tale Hellevik.

Supervision: Tale Hellevik, Arne Mastekaasa, Tilmann von Soest.

Validation: Gøril Kvamme Løset, Arne Mastekaasa.

Visualization: Gøril Kvamme Løset, Arne Mastekaasa.
Writing – original draft: Gøril Kvamme Løset.

Writing – review & editing: Gøril Kvamme Løset, Harald Dale-Olsen, Tale Hellvik, Arne Mastekaasa, Tilmann von Soest, Kjersti Misje Østbakken.

References


45. NAV [Internet]. State Register of Employers and Employees (Aa-registeret); c2015 [cited 2018 Jan 19]. Available from: https://www.nav.no/en/Home/Employers/NAV+State+Register+of+Employers+and+Employees