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Global health in Germany: Understanding interdisciplinarity in the academic sector

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A B S T R A C T

Background: Global Health (GH) in Germany increasingly becomes subject of political priority and scientists and policy makers. The aim of this study was to gain understanding of the current state, potential barriers and enablers of interdisciplinarity in GH in the academic sector in Germany.
Methods: Between October 2019 and February 2020, we conducted thirteen semi-structured interviews with ten academics and three policymakers engaged in GH in Germany. Purposive and maximum contrast sampling based on review of the literature was performed to ensure a heterogenous set of study participants.
Findings: We found that interdisciplinary exchange in GH research and education is limited in the German academic setting. Several context-specific barriers of interdisciplinary collaboration in the academic sector in Germany were detected, including terminological ambiguities and more biomedical actors being involved in global health compared to other disciplines. At the same time, enablers such as promotion of young academics and fostering topic-specific collaboration in GH research and education were identified to improve interdisciplinary working.
Conclusion: The importance of following an interdisciplinary approach is discussed and acknowledged across scientists working on GH in Germany. The current challenge is to identify which GH topics lend themselves to the collaboration of Germany-based scientists from various backgrounds and to establish common goals to advance interdisciplinarity research.

1. Background

1.1. Interdisciplinarity in global health

Global health (GH) inherently is interdisciplinary, and research and education on GH topics requires the collaboration of a variety of disciplines [1,2]. Literature on interdisciplinarity highlights that 'interdisciplinary research and collaboration are being hailed as fundamental preconditions for solving the problems and challenges facing societies and our planet' [3]. Disciplines build the foundation of interdisciplinarity. King and Brownell define an academic discipline as a field of demarcated study which is characterised by a number of distinct features, including a shared set of underlying premises, values, norms, concepts and theories or models (Table 1) [4].

DeZure, an interdisciplinary scholar, highlights that 'interdisciplinarity is not a rejection of the disciplines […] but offers a corrective to the dominance of disciplinary ways of knowing and specialization' [5]. Defining interdisciplinarity, however, seems to prove difficult. The concept of interdisciplinarity, ever since its evolution, has caused confusion and discourse, and until today, there still is no entire clarity nor agreement regarding the terminology of interdisciplinarity and related terms, such as inter-, multi-, or cross-disciplinarity that are often used interchangeably [6,7].

Agreement, however, exists that interdisciplinarity, via the integration of methods, concepts, tools or theories, can be key to the understanding of a complex phenomenon and to developing solutions to intricate problems [7].

The important role of interdisciplinarity had been already discussed by Greek philosophers, interested in the role of unity of science. The more recent watershed era of interdisciplinarity dates back to the 1960s and 1970s with many interdisciplinary educational programmes being launched and major funding being provided. Klein marks the 1960s as the decade when 'interdisciplinarity became a major topic in academic and policy orientated discourse on knowledge production and research funding [8,9]. In 1972, the OECD took a leading role within Europe on how interdisciplinarity was conceptualised. Since then, interdisciplinarity as a concept has increasingly gained importance and the number of publications on the topic has increased. Underlying reasons or motivations for promoting interdisciplinary are to unify knowledge and benefit from bringing together various viewpoints, approaches and

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Table 1
Definition of an academic discipline according to King and Brownell.

1. Field of demarcated study
2. Shared set of underlying premises
3. Shared set of concepts
4. Shared set of organizing theories/models
5. Shared set of truth-determining methods
6. Shared set of values and norms
These six qualities cumulatively come together as a unique perspective – a coherent world view – a disciplinary paradigm or matrix
7. Community of scholars who share this world view
8. Shared set of literature and great scholars in the discipline
9. Agreement on what to teach
10. Means of reinforcing the 'professional' standards
11. Departmental home in a college/university

areas of expertise to better understand and analyse complex phenomena [4].

In GH, various initiatives or projects demonstrate the success of interdisciplinarity if pursued ambitiously and with a strong impetus. For instance, the Ebola Response Anthropology Platform (ERAP) which brings together social scientists and outbreak control teams to jointly develop a response to Ebola that is adaptive, co-ordinated and iterative [10]. Definitions of key concept used in this study (global health, interdisciplinarity and academic sector) can be found in table a (supplement, [2,11,12]) Also the current SARS-Cov-2 pandemic exemplarily highlights that complex global health challenges can only be tackled with joint forces and in an interdisciplinary manner [13].

1.2. Global health in Germany

Internationally, GH is established as a discipline, with academic debates being centred mainly in the UK and US [14]. The report on *The UK's Contribution to Health Globally* from 2015 for instance revealed the culture of national and international cross-disciplinary collaborative working as one of the key strength of the university sector in the UK [15]. However, the same does not yet apply to Germany. Interdisciplinarity in GH in the German academic sector is not as progressed, [16–19] limiting the country's contributions towards research and education in GH [16]. Germany's current G7 presidency and its focus on GH matters [20], creates a window of opportunity for Germany to expand its influence in GH. Yet, Germany has been criticised for mainly applying a biomedical lens and applying a narrow focus by concentrating on health security. Experts are calling for a broader strategy and a more interdisciplinary mindset [16]. Already in 2015, the German National Academy of Sciences Leopoldina highlighted that a new emphasis on interdisciplinary research is needed, while excellent standards are to be ensured [21]. This request is supported by a position paper of the German Public Health Association informing the 2020 GH strategy of the German government [22]. Despite strong calls for interdisciplinarity in GH in Germany, little is known about the extent of interdisciplinary collaboration in GH in the German academic sector [16].

1.3. Study aim, objectives and rationale

The aim of our study was to gain understanding on interdisciplinarity in GH in the German academic context. The specific study objectives were to: 1. map and contextualise the current state of interdisciplinarity in GH in the academic sector in Germany; 2. identify which disciplines are currently involved in GH; 3. investigate potential reasons for the differential involvement of different disciplines; and 4. identify barriers and enablers of interdisciplinarity in GH in the academic sector in Germany.

By analysing interdisciplinarity in GH in Germany and addressing a gap in the current literature on interdisciplinarity, our study aims at building an evidence base which will help to improve future interdisciplinary collaboration in research and education in GH and further establish Germany as a leader in GH.

2. Methods

Between October 2019 and February 2020, we conducted thirteen semi-structured interviews with researchers and policymakers engaged in GH in the academic sector in Germany. The interviews were held at a place of their convenience or via a videoconference software program. Twenty-four potential interviewees were contacted via e-mail. 22/24 interviewees responded to the invitation. Out of 24 invited global health professionals, 19 initially agreed on being interviewed, three declined (with time constraint mentioned as reason), two did not respond at all. Interviews could be arranged with 13 participants. Due to time constraint, inability to agree on a mutual fitting appointment or non-response to e-mails to schedule appointments, the remaining five participants could not be interviewed.

Our study employed purposive and maximum contrast sampling and we applied the following inclusion criteria: familiarity with GH as a topic, either academic or policy maker, affiliation to at least one German GH entity engaged in GH research and education. Table 2 shows the characteristics of the 13 interviewees.

According to our study's research aims and objectives, an interview guide (supplement) was developed which was further refined based on one pilot interview and throughout the duration of data collection. We obtained written consent from all participants prior to the interview. Participants were free to withdraw from the interview at any time. Field notes were recorded after each interview including first impressions and associations on participants, setting and subject of research. Mean duration of interviews was 51 min and all interviews were audio-recorded and transcribed in a clean verbatim style. For data analysis, transcripts were transferred to NVIVO11 (QSR International, Melbourne, Australia).

A step-by-step approach for conducting a trustworthy thematic analysis was followed as suggested by Nowell et al. [23]. This entailed, but was not limited to, peer debriefing, researcher triangulation, reflexive journaling writing, and audit trail of code generation. The researchers' reflections on the subject of study were recorded during both data collection and data analysis. One of the main reflections centred on the key researcher's background in medicine and how this has potentially affected data collection and analysis.

In order to increase reliability and to ensure that interpretation was credible, and the rationale for themes and codes identifiable, two additional researchers coded a subset of interviews and deviant cases were discussed in the team [24]. Analysis involved an iterative process of pilot-coding, analytic- and meta memo writing, re-coding, code mapping and ultimately identifying patterns and themes [25,26]. Themes were generated both in an inductive and an a priori approach. The former evolving from the data, the latter being informed by the

Table 2
Interviewees' characteristics.

Gender f/m	8/5
Type of interviewee (policymaker/academic)	3/ 10
Academic background*	5 medicine 4 public health 4 social sciences 3 natural sciences 2 humanities 1 epidemiology
Duration of engagement in GH in years (range)	3 years – 30+ years
Professional level (jun/mid/sen)	2/2/9
Self-perceived identity as GH professional (yes/no/unsure)	9/1/3
English/ German	11/2

*counts per discipline, categories defined as discipline participants had self-identified with when being asked during the interview, multiple entries possible.

researchers' prior theoretical understanding of the phenomenon and questions being asked during the interview [27]. Ensuring rigour in analysis was an important goal to achieve. We used the consolidated criteria for reporting qualitative research (COREQ) checklist to guide the reporting of our methods and results (table c, supplement).

The research project was approved by LSHTM Research Ethics Committee (LSHTM Ethics Reference Number 17,827).

3. Findings

In the findings section, we first shed light on the current state of interdisciplinarity. Then, an overview of barriers and enablers of interdisciplinarity is given. Throughout the remainder of the results section, the barriers and enablers will be elaborated on. They will be presented by themes that evolved during the analysis. Presenting barriers and enablers according to themes will illustrate that several aspects were perceived as both barriers and enablers.

3.1. The current state of interdisciplinarity

The majority of interviewees (12/13) agreed that a diverse set of disciplines is required to work on GH challenges and questions. As a public health professional stated: *'It is critical and I believe the really big issues of our times can only be addressed through interdisciplinary research'*. Asked about which disciplines make up the core of GH (table b), participants most commonly mentioned medicine (10/12), public health, (9/12), social sciences (9/12).

Despite a wide-spread acknowledgement of the need to engage a wide variety of disciplines in work on GH issues, the majority of participants (11/13) found a lack of interdisciplinarity existed in GH research and education in Germany. They perceived GH research and education to be *'in the early, early beginning'* and that academics were only beginning to think *'about how to create an interdisciplinary environment for working together in GH in Germany.'*

3.2. Overview of barriers and enablers of interdisciplinarity in the academic sector in GH in Germany

Throughout the interviews, participants mentioned a high number of barriers and enablers of interdisciplinary collaboration that they perceived to be specific to the German academic context (Table 3)

Table 3
Barriers and enablers of interdisciplinarity in the German academic context.

	Barriers	Facilitators
Concept of global health	• Unfamiliarity with the concept of global health • Lack of definition of global health • Fussiness of global health as a label • Varying disciplinary understanding of the concept of global health • Lack of self-identification as global health professional	• Creation of a new term
Actors and networks	• Supremacy of biomedical network, shortage of non-biomedical network • Neglect of the non-biomedical sciences • Personal interests	• Mitigation of power dynamics • Establishment of a non-biomedical network • Strengthening of non-biomedical sciences
Building Global Health Expertise	• Demand for more global health education • Career opportunities • Shortage of global health expertise	• Generation of professorships • Support of young academics • Expansion of global health education • Establishment of global health as a discipline
Policy initiatives	• German federalism • Lack of leadership	• Governmental global health strategy • Political will • Leadership • Incentives
Funding mechanisms	• Focus on biomedical research	• German Research Foundation • Interdisciplinary funding boards • Top-down approach
Shared spaces		• Events • Global health centre

3.3. Understanding of the concept of GH in context of interdisciplinarity

The lack of clarity of, and the unfamiliarity with, the concept of GH was, at least for some, identified as a barrier for interdisciplinary collaboration. It became clear that interviewees had a different understanding of the importance of a universally accepted definition of GH. More senior actors criticised a perceived lack of a common definition and identified this as a barrier of interdisciplinarity. Some interviewees stated that the term GH was frequently used as a label or buzz word while the actual meaning of it remained unclear. One senior public health professional with a mixed background explained

> *'I think there is a lot of interest and what I am afraid of is that people just start labelling themselves as GH without actually knowing what it means'*

Confronted with a lack of clarity regarding the different understandings of the concept of GH, more junior participants suggested to appreciate the existing differences in understanding rather than getting hung up on them.

In context of varying disciplinary understanding on the definition of GH, a lack of identification as GH professional was found. While the majority of participants (9/13) identified as GH professionals, results indicate that there are scientists in Germany working on GH matters who do not identify as GH professionals. This lack of identification with the field was recognised as barrier to interdisciplinary collaboration. Some participants assumed that certain actors from a non-biomedical background who engaged in GH yet did not identify as GH professionals were less known and less connected. One reason for this could be the fact that non-biomedical actors may not relate to the term 'GH' as such. A policy maker reported:

> *'[…] I think there are lots of actors that are contributing to better GH that are not aware that they were working in the field because they just not connected to the term GH as such.'*

In order to be more inclusive, creating a new term was proposed to help various disciplines identifying with the matter of subject and to ultimately foster interdisciplinarity.

3.4. Topic specific collaboration

In context of interdisciplinary collaboration and how to foster it, interviewees mentioned that instead of trying to define the terminology and discuss the lack of interdisciplinarity in GH, it would be more useful to take a topic-based approach. They argued that trying to solve a problem would automatically lead to an increase in interdisciplinarity. One interviewee with a mixed background highlighted the role of focussing on topics in GH (e.g. climate change and health) as a major enabler of interdisciplinarity and stated

> *'If you position the idea around a typical problem, then suddenly people want to contribute to solve the problem with their very particular expertise and they are very happy of collaborating in a multidisciplinary or interdisciplinary setting.'*

Topic-specific collaboration in GH research and education was perceived as a key enabler for interdisciplinarity and a potential means

to circumvent confusion about the terminology and reluctance to collaborate.

3.5. Actors and networks

According to some experts, a disciplinary imbalance of more biomedical actors being involved in GH compared to other disciplines impeded interdisciplinarity. The majority of participants (11/13) stated that the bulk of actors engaged in GH had a biomedical background which was perceived to hinder interdisciplinarity. The sheer volume of biomedical actors was mentioned as one of the reasons for more biomedical actors being involved in GH. Some accounts indicated that a group, described as self-contained, of mainly biomedical actors had a strong hold on the GH research agenda.

In addition to the predominance of biomedical actors, some participants considered the comparably small number of non-biomedical actors engaged in GH as a barrier for interdisciplinarity in GH in the academic sector in Germany. Several participants stated that there is no GH community of non-biomedical disciplines and that other disciplines do not have networks promoting their interest as the case for the biomedical GH community.

Participants across all disciplines found that non-biomedical disciplines were often mainly asked to complement biomedical research projects, constituting a barrier to real, mutual interdisciplinary collaboration. Interviewees with a non-biomedical background, especially those with a social science background, criticised that the social sciences were often treated as an add-on to biomedical projects. A senior social scientist stated

> *'and then, when it's opportune, you bring in other disciplines, but rather reluctantly, so you also invite social scientists, but they're kind of an add-on to, like, a core agenda that you already have […]'.*

Strengthening the social sciences was seen as a first step to enable interdisciplinarity in GH in Germany. One participant argued that promotion and support of the social sciences was crucial to generate more equity amongst disciplines in GH. Questioned about what was needed to enable interdisciplinarity, she stated:

> *'From my very particular position I would say first strengthening social sciences in themselves. So that they can become partners.'*

Interviewees perceived making interdisciplinarity a political priority as vital to foster interdisciplinarity. Further measures to mitigate power dynamics that were named by interviewees included funding mechanisms (e.g. top-down approaches by funders), more GH education (GHE) at biomedical and non-biomedical institutions, bringing actors from different disciplines physically together, and awards and prizes for interdisciplinary GH research.

3.6. Building GH expertise

Expanding the future expertise in GH by promoting GH education, career opportunities and young academics was considered enabler of interdisciplinarity. An interviewee who had been trained abroad reported that when returning to Germany to work on GH ten years ago, the field had basically not existed. Similarly, a junior interviewee reported from their own experiences of trying to study global health. *'After my studies* [around 2014], *I wanted to do [a] master in global health which was not possible in Germany during that time. […] It just started now.'*

Throughout the interviews, participants across all disciplines mentioned the next generation of researchers or young academics in their early or mid-career stages as key measure to enable interdisciplinarity. One public health professional stated:

> *'I think we could do a lot of good if there was some collaboration fostering young people, and maybe even the next generation will grow up being a bit differently minded.'*

Promising measures to foster interdisciplinarity in early career researchers included junior research groups or programmes, postdoc tandems, small grants for interdisciplinary doctoral student teams, and student societies or initiatives. GHE and the current lack thereof, was both described as a barrier of interdisciplinarity and an important enabler of future interdisciplinarity.

Another key barrier which was noted by some academics and policy maker was missing career opportunities in GH in Germany. For instance, limited positions at a more senior level and a lack of professorships were reported, stressing that these aspects made career paths inflexible and less attractive, especially when compared with other countries. To provide an example, an interviewee criticised that the German national public health institute demanded medical degrees for many positions that could be executed by non-medical personnel.

3.7. Funding mechanisms

With the German Alliance for GH Research funded by the German Ministry of Education and Research and the GH Hub being funded by the Ministry of Health, funding mechanisms were acknowledged as one important example of how interdisciplinarity could be fostered. Around half of the interviewees argued that the German Research Foundation (Deutsche Forschungsgesellschaft – DFG, Germany's main funding agency under the auspices of the federal government and the states) could act as crucial enabler of interdisciplinarity. Various suggestions were made with regard to how funding mechanisms could foster interdisciplinarity. One participant suggested to make interdisciplinarity compulsory for GH research funding and establish distinct evaluation criteria that proposals would have to meet. Participants reported that interdisciplinary funding boards were scarce in Germany and stated that such boards could act as enablers to ensure disciplinary diversity and assess research proposals in an equitable manner.

3.8. "Shared spaces" for interdisciplinary collaborations

Several interviewees stressed the importance of creating an interdisciplinary environment to foster interdisciplinarity. The role of in-person meetings and "shared spaces" was highlighted to promote creating an interdisciplinary environment and shape a GH identity. One expert mentioned that *'One of the big advantages of the London school is that they are under one roof. And I think that is what is yet missing in Germany. Sort of a physical house where people can be talking.'*

Events on both academic and policy level which bring different actors together, including congresses, prizes and awards, conferences, expert committees, lecture series, workshops and training courses, were considered enablers for interdisciplinarity.

4. Discussion

Our analysis of interdisciplinarity in GH shows that, in line with interdisciplinarity being a core feature of GH, [2]. German key academics and policy makers acknowledge that multiple disciplines need to be enlisted in GH debates to develop solutions to current GH problems. However, our analysis also shows that interdisciplinarity is far from established in GH in the academic sector in Germany and has not been a core priority in recent years [17].

Participants of our study identified several context-specific barriers of interdisciplinary collaboration in the academic sector in Germany such as conceptual ambiguities, more biomedical actors being involved in GH compared to other disciplines, funding mechanisms and a shortage of interdisciplinary GH expertise. Maybe unsurprisingly, the findings of our study indicate that GH in Germany is still largely dominated by the biomedical sciences and that the strong focus on biomedical research [17], reinforced by discipline-specific funding, acts as a disincentive to hypothesis-driven research. At the same time, our analysis identifies enablers to overcome barriers, such as topic specific

collaboration, the promotion of young academics, shared physical spaces, interdisciplinary funding boards, and prizes and awards. Our results add to the current political debate in Germany which highlights the importance of interdisciplinary working in the field of GH [17,28]. Germany's current G7 presidency may provide momentum to advance global health and address the lack of interdisciplinarity in global health research and education in Germany. We believe that our results could thus have a considerable impact on the current academic and political debates about global health in Germany.

Our analysis shows that professionals' understanding of GH varies widely across disciplines and that this lack of uniform understanding constitutes a key barrier to interdisciplinary exchange. This aligns with a previous German study on the concept of GH, revealing that 'the understanding of GH is closely linked to the biographical background, research focus and interests of the interviewee.' [29]. Literature on attempts to define GH is vast, [2,30-32] yet an agreement on a universally accepted definition is pending. Whether striving for a universal definition is desirable or not has been subject of discussions amongst GH experts for years. Koplan et al. highlighted in their 2009 landmark article that 'without an established definition [of GH…] we cannot possibly reach agreement about what we are trying to achieve, the approaches we must take, the skills that are needed and the ways that we should use resources' [2]. While in our analysis, the perceived importance of reaching a universal definition was not consistent, at least for some participants, terminological ambiguities were seen as a barrier of interdisciplinary working. Whether trying to develop a joint definition or to simply appreciate that definitions vary across disciplines is more fruitful for advancing interdisciplinary collaboration in GH and also, whether it is at all possible, remains to be seen.

Our study indicates that notwithstanding a joint definition, focussing on specific topics and problems in GH may act as a key enabler of interdisciplinarity and help to counter conceptual ambiguities. According to academics' and policymakers' accounts, focusing on real-life challenges can help to develop interdisciplinary teams. Our findings correspond with the literature on interdisciplinarity which highlights that 'collaborative problem-framing is at the very heart of the interdisciplinary research project' [33]. Furthermore, study participants mentioned a current prominent focus on basic science research in Germany and suggested to focus on topic-specific collaboration in GH research and education, notably on topics which currently seem to be neglected in Germany, to facilitate interdisciplinarity.

In this context, our results highlight a disciplinary imbalance with mainly actors from a biomedical background engaging in GH and forming an informal network. It seems that the network's strong focus on, and high level of expertise and experience in, biomedical sciences reinforces disciplinary power imbalances, which in turn are considered a major barrier of interdisciplinarity. Mitigating these power dynamics was considered an enabler of interdisciplinarity and interviewees proposed a number of potential measures which could be considered by future policies, such as more GHE at biomedical and non-biomedical institutions, bringing actors from different disciplines physically together, and awards and prizes for interdisciplinary GH research. Simply asking non-biomedical scientists to complement biomedically designed research projects, on the other hand, was found to reinforce that more biomedical actors are involved in global health compared to other disciplines and to ultimately impede interdisciplinarity. This is in line with a study of Viseu et al. who highlight that collaboration is 'too often asymmetrical' and claim that social science and humanities scholars 'are often brought into research projects not as scientists in their own right, but to 'maximise' the benefits of research' and to mitigate negative impacts and ensure public acceptance' [34]. Future policies should aim to support non-biomedical groups of scientists forming networks to be able to collaborate with biomedical networks on eye level. Our findings also reveal that some scientists from non-biomedical backgrounds, while working on GH research topics in Germany, do not identify as GH professionals. Integrating these actors into the GH community could be a way of expanding GH expertise and at the same time utilising their esteemed and diverse expertise.

Extending interdisciplinary GH expertise emerged as one of the key enablers of interdisciplinarity identified by our analysis. With increasing GH challenges, expertise in GH has to grow. Funding decisions and policies on education need to be aligned with these evolving needs [35]. The importance of expertise for building interdisciplinarity and networks for innovation has been highlighted by the literature [36] and corresponds with our results. GHE is one means to promote GH expertise amongst students and young academics. Existing literature indicates a lack of GHE in Germany [18,37,38] with only 6% of medical faculties making GHE a compulsory part of their curriculum [39]. At the same time, students are strongly interested in learning more about GH [37]. Currently, GHE and the debate around it mainly takes place at medical universities, [18] potentially impeding on interdisciplinary exchange. Our analysis suggests that if GH is only taught at medical universities it tends to be more focused on biomedical aspects. Establishing GH departments at non-biomedical universities or as independent centres could thus, in fact, help to ensure disciplinary diversity and tackle existing institutional barriers.

The application of King and Brownell's features of an academic discipline [40] to the German context reveals that the situation with regard to GHE in Germany might influence current shortcomings in interdisciplinary work in German academia. It highlights that GH cannot be defined as an academic discipline in Germany. Key attributes (Table 1) that are missing include a shared set of literature, agreement on what to teach, means to reinforcing 'professional' standards or a departmental home in a college or university [4,40]. The fact that GH is not yet established as an academic discipline in Germany is likely to hinder the expansion of career opportunities, which indicates that working on establishing GH as an academic discipline might help to counter some of the barriers to interdisciplinarity.

In line with existing literature, our analysis highlights the importance of funding as a fundamental and structural barrier to interdisciplinary working in the German academic context and the fact that funding mechanisms are an important enabler to promote interdisciplinarity [41]. Germany has almost doubled its overall GH funding for large governmental organisations such as WHO from US $190.6 million in 2016–2017 to US $358.8 million in 2018–2019 [42] and has increased funding by 17.6% up to €1 billion (for the upcoming three-year period) for GH Initiatives such as the Global Fund [43]. However, compared to other countries such as the UK [44], general but also interdisciplinary domestic GH research funding in Germany is lacking. Our study participants' accounts are in line with Kickbusch et al. who have been calling for an increase in domestic GH research funding with special emphasis on supporting exchange between social and life sciences [17,18]. In terms of current GH funding in Germany, current figures suggest that funders in Germany are not yet playing out their full potential to shape and accelerate interdisciplinarity in GH. A study by Gerhardus et al. investigated funding of interdisciplinary public health projects and compared it to biomedical projects. The authors found that over the past decades, few interdisciplinary public health research proposals have been received and funded by the DFG, and although the acceptance rates for proposals did not differ widely between health fields, the awarded funding to projects in public health was considerably smaller compared to funding for biomedical projects [45]. Therefore, our analysis highlights the need for a shift towards more incentives for interdisciplinarity in GH funding. And therefore, the promotion of interdisciplinarity through funding in Germany will be crucial.

Our analysis suggests that in-person interactions and shared spaces are considered one of the key enablers of interdisciplinarity which corroborates with existing literature [46]. In order to promote GH and facilitate interdisciplinary work, the German government has launched and financially supports a number of GH initiatives and tools (e.g. the German Alliance for GH Research [47] or the GH Hub [28]) These new

initiatives, programmes and strategies highlight that a window of opportunity to shape policies on interdisciplinarity in the German academic setting is wide open and could be exploited [48]. Seizing these initiatives and initiating seed events and projects can be used as intermediary steps until structural barriers such as funding and policies are advanced. Our analysis shows that an additional focus of in-person interactions to foster interdisciplinarity could be on networking amongst GH students and early career researchers in GH. Supporting the next generation in building interdisciplinary networks is likely to strengthen interdisciplinarity in the future [49].

Our study analyses the current state of interdisciplinary work in GH in the academic sector in Germany. Future research could help to explore context-specific features of interdisciplinarity or analyse interdisciplinary collaboration over time. Such research could help to better understand potential barriers and enablers of interdisciplinarity and identify appropriate markers which could be used to assess interdisciplinarity [50]. Research on, and evaluation of, existing policies and tools to foster interdisciplinarity can help to explore which approaches may be effective and could contribute to increased interdisciplinarity in GH in Germany in the long term.

4.1. Limitations

The aim of our study was to shed light on interdisciplinarity in the academic sector in GH in Germany. Transferability to other settings or countries was not intended. However, we believe that a number of barriers and enablers that were identified may also apply to other settings and therefore our work can be of interest to an international audience. More than half of all study participants were female with a varying level of experience which may have led to over- or underrepresentation of certain views. Yet, we have no reason to assume that the summarised views of those interviewed strongly deviate from the views of the wider global health community in Germany. A further limitation of our project may have been that terminology of our study's key concepts (GH and interdisciplinarity) are inherently vague. Therefore, interviewees' understanding of these concepts may have differed across disciplines and individuals.

Conclusion

Interdisciplinarity in GH in the academic sector in Germany is not common practice, yet interdisciplinarity has been ranked high on policy agendas in recent years. Various context specific barriers of interdisciplinary exchange in GH in the academic sector in Germany include terminological ambiguities, more biomedical actor being involved in GH compared to other disciplines, discipline-centred funding mechanisms, a lack of self-identification as GH professionals and a comparably limited amount of GH expertise. Following a problem-based approach and focussing policies and funding on topics and real-life problems (rather than disciplines) could be promising facilitators of interdisciplinarity. The current challenge is to identify topics that allow engagement from scientists from various backgrounds and to build common denominators and common goals to foster the establishment of interdisciplinary research.

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CRediT authorship contribution statement

Caroline I Gotsche: Conceptualization, Methodology, Formal analysis, Writing – original draft. **Heide Weishaar:** Conceptualization, Methodology, Formal analysis, Writing – review & editing. **Johanna Hanefeld:** Conceptualization, Methodology, Formal analysis, Writing – review & editing.

Declaration of Competing Interest

None declared.

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