Perspectives in Public Health

- We do things differently here: the Greater Manchester approach to preventing alcohol-exposed pregnancy
- Improving population health by supporting breastfeeding better
- Community Partnered Participatory Research methods as tools for racial justice and health equity
- 'Creating health': evaluation of three arts for health training events for GP trainees

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EDITORIAL

Editorial

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A warm welcome to our stimulating September issue of *Perspectives in Public Health*. We start with a thanks to our team for helping pull this issue together and to all the peer reviewers who make the publication of such work possible. As I put pen to paper for this editorial, many countries in the Northern Hemisphere are heading into a summer of new optimism. For those of us in the Southern Hemisphere, we are heading into the depths of winter wondering what the next few months of the pandemic will bring. However, as Wise suggests in our Feature article, as the COVID-19 restrictions are eased for many around the world, we have a golden opportunity to build back better, particularly in relation to our public health.

In this issue, there are several illuminating articles that cover an impressive breadth of important public health topics. Nagesh et al. remind us of the unprecedented times we live in and the importance of eye health with the UK's first socially distanced public engagement for Nation Eye Health Week 2020. There is also a fascinating discussion of Community Partnered Participatory Research methods as tools for racial justice and health equity by Brooks and Fields.

Peer-reviewed material includes a paper from Burns et al., who highlight the importance of retirement as a key life transition and explore the contribution that creativity, in the form of active participation in the arts, can make for the older person's transition to retirement. Active retirement will become particularly important given our ageing population. 'The Greater Manchester approach' to preventing alcohol-exposed pregnancy by Reynolds et al. describes a focus on the components of the co-designed alcohol-exposed pregnancy programme and the local impacts as well as learning for wider and national impacts. Perhaps some of this learning will be relevant for the challenges of increased consumption of alcohol during COVID-19-related lockdowns.

Other papers include Parackal et al. who investigate the suitability of a dynamic transactional model of communication for explaining the use of social media for communicating public health messages; and O'Malley and colleagues, who explore the fast-food and planning appeals system in England and Wales focusing on decisions made by the Planning Inspectorate. Finally, Arafat summarises how the use of a 'one size fits all approach' that does not conform with Pakistani, Somali and Yemeni patients' linguistic, cultural and religious values may hinder access to, and the outcomes of psychological therapy programmes, and Ellis et al. evaluate three arts and health training events for general practitioner trainees.

There really is something for everyone in this issue of *Perspectives in Public Health*, and I hope you enjoy engaging with it.

cpd ARTICLE

The July 2021 CPD paper was 'Associations of loneliness and social isolation with physical and mental health among adolescents and young adults' by J Christiansen et al.

Answers: 1b, 2d, 3d, 4d

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ORIGINAL PAPER

Informing the UK Muslim Community on Organ Donation: Evaluating the Effect of a National Public Health Programme by Health Professionals and Faith Leaders

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Abstract

There is a significant shortage of transplantable organs in the UK particularly from Black, Asian and Minority Ethnic (BAME) groups, of which Muslims make a large proportion. The British Islamic Medical Association (BIMA) held a nationwide series of community gatherings with the aim of describing the beliefs and attitudes to organ donation amongst British Muslims and evaluate the efficacy of a national public health programme on views and uncertainties regarding religious permissibility and willingness to register. Eight public forums were held across the UK between June 2019 and March 2020 by the British Islamic Medical Association (BIMA). A panel of experts consisting of health professionals and Imams discussed with audiences the procedures, experiences and Islamic ethico-legal rulings on organ donation. Attendees completed a self-administered questionnaire which captured demographic data along with opinions before and after the session regarding religious permissibility and willingness to register given permissibility. A total of 554 respondents across seven UK cities were included with a M:F ratio 1:1.1. Only 45 (8%) respondents were registered as organ donors. Amongst those not registered multiple justifications were detailed, foremost of which was religious uncertainty (73%). Pre-intervention results indicated 50% of respondents were unsure of the permissibility of organ donation in Islam. Of those initially unsure or against permissibility or willingness to register, 72% changed their opinion towards deeming it permissible and 60% towards a willingness to register indicating a significant change in opinion ($p < 0.001$). The effectiveness of our interventions suggests further education incorporating faith leaders alongside local healthcare professionals to address religious and cultural concerns can reduce uncertainty whilst improving organ donation rates among the Muslim community.

Keywords Organ donation · Transplantation · Muslim · Black, Asian and minority ethnic (BAME) · Inequalities · Faith · United Kingdom

Extended author information available on the last page of the article

Introduction

There is a significant shortage of organ donors from Black, Asian and Minority Ethnic (BAME) groups in the United Kingdom (UK) despite numerous public education campaigns. BAME groups represent 14% of the British population, (Office for National Statistics, 2011a) but only 7% of the opt-in NHS Organ Donation Register, and 31% of patients on the transplant waiting list (NHS Blood and Transplant, 2019). There is therefore a large discrepancy between need for transplantation and availability of well-matched organs, with specific blood group and tissue type combinations more common among minority ethnic groups. Median waiting times for adult kidney transplants for BAME patients are approximately 230 days longer than for White patients (NHS Blood and Transplant, 2019). This has implications on survival and quality of life, as well as increasing costs to the NHS given longer waiting times and most patients receiving dialysis as an alternative form of renal replacement therapy.

Barriers to organ donation (OD) reported by members of the BAME community include a lack of knowledge on the process of OD and registration, faith and cultural beliefs, bodily concerns with regards to disfigurement and resurrection, family influence and a mistrust in doctors and the healthcare system (AlKhawari et al., 2005; Morgan, 2015).

Muslims represent 5% of the British population (Office for National Statistics, 2011b) and an estimated one-third of the UK BAME population (Muslim Council of Britain, 2015). Many Muslims perceive the position of their religion as a decisive factor in their behaviour towards OD (Ghaly, 2012). The majority, though not all, of Islamic scholarly opinion is in favour of organ donation's permissibility—in 1995, the Muslim Law (Shariah) Council of the UK issued a fatwa (legal verdict) deeming OD permissible, in line with major global religious institutions such as the European Council for Fatwa and Research, Islamic Fiqh Academy of the Organisation of Islam Conference, and Al-Azhar Academy of Egypt (Ryan, 1996). These legal verdicts are non-binding, and Muslims are free to select any appropriately issued fatwa based on the presented arguments and perceived moral authority of the jurisconsult. However, a lack of familiarity with religious rulings has been consistently demonstrated amongst Muslim communities in the UK and abroad (Afzal Aghaee et al., 2015; Ahmed et al., 1999; Altraif et al., 2020; Aslam & Hameed, 2008). Multiple studies have correlated increased awareness of the prevalence of organ donation and its Islamic opinion with increasing willingness to donate (Afzal Aghaee et al., 2015; Al Moweshy et al., 2022; Krupic et al., 2019; Taş et al., 2021).

With the recent law change in the UK and transition to an opt-out system, it is important to enable British Muslim communities to make fully informed decisions. Preliminary ethnicity data suggests those who opt-out of the donor register are more likely to be from BAME background, and 56% of opt-outs in 2019 were made by people of an Asian background (NHS Blood & Transplant, 2019). The UK's OD Taskforce recognised an urgent need to identify and implement the most effective methods to promote OD and registration to the public generally and ethnic minority

populations specifically (Department of Health, 2008). Multiple public health educational methods have been explored in the literature (Baines et al., 2002; Morgan et al., 2016). Mass media campaigns have shown limited effect in producing change at a registration level and dealing with the varied concerns of minority groups (Oliver et al., 2010; Deedat et al., 2013; Khan & Randhawa, 1999). A strong interpersonal component increases success rates, and the previous use of "peer educators"– ordinary members of the community belonging to minority groups–in holding OD awareness events has proven successful (Krupic et al., 2019; Long et al., 2013).

Engaging faith leaders has been shown to be of value in facilitating health behavioural changes amongst their respective communities. Local faith leaders act as "boundary spanners" who can permeate organisational and cultural boundaries and be a bridge between organisations and local communities (Long et al., 2013). Extensive involvement of local and regional faith institutions was observed during the coronavirus pandemic in promoting precautionary measures and vaccination amongst communities typically considered hard to reach (Dascalu et al., 2021; Gildea, 2021; Guthrie et al., 2021; Randhawa et al., 2010; Wells et al., 2022). For example, healthcare chaplains have been noted to regularly engage in organ procurement discussions, and their involvement in providing training for other community Imams in navigating these topics should be encouraged (Carey et al. 2011).

The primary aim of this study is to examine the effect of an educational session delivered by local healthcare professionals and religious leaders within different Muslim communities on levels of awareness and uncertainty pertaining to the process and Islamic discussion on OD. The secondary aims of this study were to explore both the effect of these interventions in resolving the uncertainties among attendees unsure of the Islamic ethico-legal attitudes towards OD and the willingness of these communities to register for OD post-intervention.

Our first hypothesis was that there is a substantial lack of awareness of or familiarity with established religious rulings on OD amongst British Muslims affecting willingness to register. Our second hypothesis was that a focused educational intervention delivered by Imams and health professionals informing Muslims of the current OD process and Islamic legal discourse can increase willingness to register.

Methods

The British Islamic Medical Association (BIMA) organised a national campaign named "Let's Talk about Organ Donation" with the aim of determining British Muslims' attitudes towards OD and increasing awareness of the OD process (Ali et al., 2020b). Between June 2019 and March 2020, eight open public forums were conducted across the country (sittings in Glasgow, Leeds, London, Manchester, Newcastle, Nottingham and two in Bradford). These locations were selected for their relatively generous local Muslim populations. The events were held in a mixture of settings including public spaces, mosques and universities. Events were advertised to the local community via social media, mosque announcements, the distribution of posters and leaflets in mosques and Islamic study circles, GP surgeries, pharmacies

and through word of mouth. The first session was a pilot run in Newcastle with 86 subjects to evaluate and receive feedback on feasibility, session content and the questionnaire (Ali et al., 2020a).

During each event, attendees listened to a panel of experts consisting of various OD and transplantation healthcare professionals, specialist nurses in OD, Islamic scholars, local Imams and Muslim patients who had received or were waiting for an organ transplant. Healthcare professionals included consultants in Critical Care, Nephrology, Transplant surgery and regional clinical leads for OD. Whilst certain sections such as the Islamic bio-ethical discussion were delivered by the same speaker and the same presentation slides were used, other healthcare speakers were local and therefore varied with location. The same range of speaker types was pursued as above to promote consistency in messaging. Panel speakers were identified by a central BIMA OD team in collaboration with local BIMA teams. The purpose of the campaign was explained and content from the pilot event shared to highlight the main themes covered and to act as a framework for the forum's targets and learning objectives. Speakers were provided advice in advance on emphasising the impartiality of content delivery and an understanding of the accepted heterogeneity in acceptable scholarly opinion. The panel was succeeded by a live Q&A session.

Each intervention lasted approximately 2–3 hours and involved discussions on the following topics: the panel introducing the concept of OD and relevant statistics, patient experiences of being a recipient or on the waiting list, the OD process and law change, a discussion on British Muslims' attitudes and organ transplantation from the perspective of the Shariah (Islamic law). The latter discussion involved familiarising the audience with the current available fatawa on OD, the ethical and moral discourse behind scholars' conclusions and addressing common misconceptions about OD.

Attendees were asked to complete a 9-item anonymised, confidential, self-administered questionnaire in English comprising mostly closed-ended questions with specific answer categories. Due to time constraints in delivering this intervention before the UK system change, our questionnaire was not validated. The questionnaire was composed of two sections (Appendix 1). Part A included questions about age, gender, ethnicity, OD registry status and whether the attendee had ever considered joining the registry and if the answer was negative, an open question regarding the reasoning behind this. Subsequently, there were two questions which were each repeated in part A (before the panel discussion) and part B (after the panel discussion). These questions asked whether the attendee felt OD is permissible, and given permissibility whether they would register for OD.

Results on the categorical variables were presented as percentage values. Analysis was performed using version 26 of the SPSS software. Pearson's Chi-squared statistical test was used to evaluate correlations between different variables. Values with $p < 0.05$ were deemed statistically significant.

Table 1 Demographic data

Demographics	Number of respondents (%)
Age (years)	
< 20	98 (**17.7**)
21–40	219 (**39.5**)
41–60	182 (**32.9**)
61–80	52 (**9.4**)
> 80	3 (**0.5**)
Gender	
Male	266 (**48.0**)
Female	288 (**52.0**)
Ethnicity	
Pakistani	318 (**57.4**)
Indian	69 (**12.5**)
Arab	51 (**9.2**)
Bangladeshi	49 (**8.8**)
White	29 (**5.2**)
Other	38 (**6.9**)
Location	
Bradford	168 (**30.3**)
Glasgow	36 (**6.0**)
Leeds	54 (**9.7**)
London	58 (**10.4**)
Manchester	51 (**9.2**)
Newcastle	86 (**15.5**)
Nottingham	101 (**18.2**)

Results

Demographics

A total of 554 attendees completed the questionnaire. The total number of attendees was not recorded due to the open nature of the forums.

Respondents were subdivided into groups based on age, gender, ethnic origin, location, and OD card possession. Respondent demographics are highlighted in Table 1. The male to female ratio was 1:1.1. The most prevalent ethnic group within the study cohort was Pakistani (57.4%), followed by Indian (12.5%) and Arab (9.2%). Bradford (30.3%) had the highest proportion of participants across its two sittings, followed by Nottingham (18.2%) and Newcastle (15.5%).

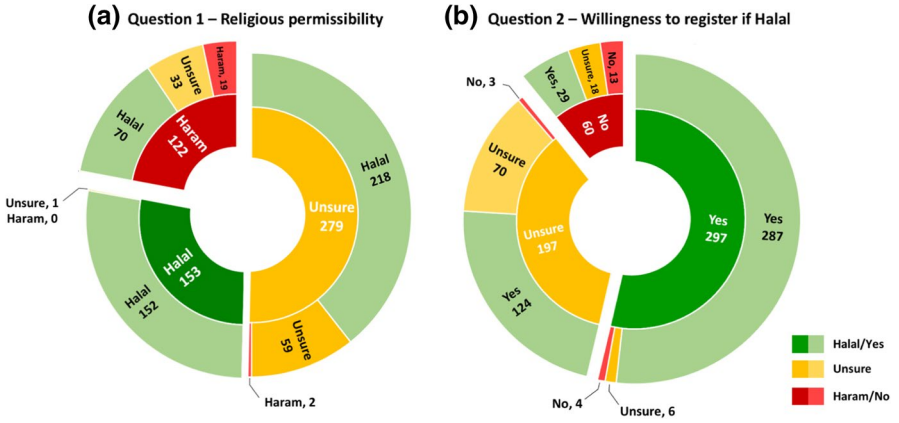

Fig. 1 Pre-and post-intervention perceptions of **a** religious permissibility, **b** willingness to register if OD was considered Halal. Inner ring displays the number of responses pre-intervention. Outer ring displays the number of responses post-intervention, broken down according to pre-interventional response

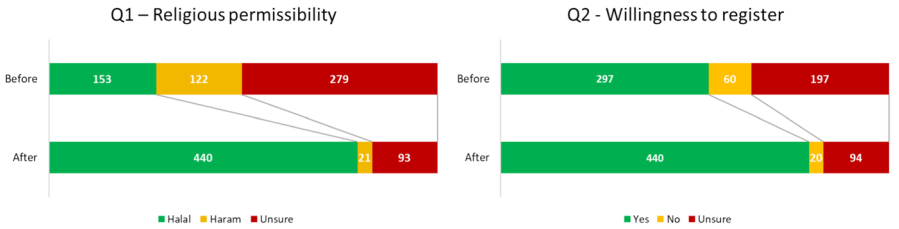

Fig. 2 Stacked chart demonstrating overall change in number of responses for Questions 1 and 2 before and after the intervention

Organ Donation Registration

Only 45 (8.1%) respondents were already registered for OD before the event, and of those not registered, 138 (27.1%) indicated they had previously thought about registering. Those who documented their reasons for not registering ($n = 127$) cited multiple reasons broadly classified as faith beliefs and views on religious permissibility (73%), lack of knowledge on OD (21%), family influence and reluctance to discuss OD (2%), death and burial concerns (2%) and moral considerations (2%). Though the sample size of white participants was small, respondents from BAME backgrounds (Pakistani, Indian, Arab, Bangladeshi) were significantly less likely to be registered as organ donors than their White counterparts ($p < 0.001$), with 10 out of 29 (34.5%) White ethnicity respondents already registered but only 33 out of 487 (6.8%) respondents of BAME background (Ali, 2020).

Responses to Question 1 and 2

Before the education session, when questioned on their perception of the permissibility of OD in Islam (Question 1), a minority considered OD to be permissible (27.6%) and half (50.4%) were unsure. After the education session, 79.4% of participants considered OD permissible, amounting to a 51.8% increase ($p < 0.001$, see Fig. 1). There was a corresponding 18.2% decrease in participants deeming OD impermissible ($p < 0.001$), coupled with a reduction of 33.6% in participants among the 'Unsure' population ($p = 0.006$).

Question 2 explored whether the respondent would consider registering as an organ donor under the condition that OD was religiously permissible (Question 2). A total of 53.6% of participants answered 'Yes' pre-intervention; the remaining 46.4% answered 'No' or 'Unsure'. Post-intervention there was a 25.8% increase in participants answering 'Yes' ($p < 0.001$), coupled with a decrease of 7.2 and 18.6% in respondents objecting to or unsure of registration, respectively ($p < 0.001$, see Fig. 2).

Statistical Analysis

For Question 1 no specific age or gender group was more likely to select a particular response pre-or post-intervention, and generally most groups manifested a significant shift post-intervention towards permissibility and away from impermissibility. Across all ethnic groups evaluated, a statistically significant increase in 'permissible' responses and decrease in 'impermissible' responses following the intervention was observed using the Chi-squared test. The Pakistani subgroup had the greatest proportion of 'impermissible' responses pre-intervention at 25.8% of responses, which became 4.4% post-intervention, demonstrating a statistically significant 21.4% reduction ($p < 0.001$). With regards 'unsure' responses, only the Arab subgroup demonstrated a significant reduction post-intervention ($p = 0.024$). Subjects who did not possess an OD card were mostly 'unsure' before the intervention (52.5%). Within the subgroup not possessing an OD card, all shifts of opinion were statistically significant. No statistically significant changes were found in the smaller subgroup already in possession of an OD card. Within the group already in possession of an OD card, 12 (26.7%) thought OD was 'impermissible' pre-intervention.

For Question 2, a statistically significant increase in "Yes" responses and decrease in "Unsure" responses was observed across all age groups, with all groups under 55 years also showing a significant decrease in "No" responses ($p < 0.05$). Across both sexes, all such net shifts were statistically significant. There was a statistically significant increase in 'Yes' responses for all ethnicities ($p < 0.05$), except for respondents of white ethnicity. All but respondents of Arab background showed a statistically significant decrease in "No" responses, the largest of which was amongst Pakistanis at 8.2% ($p < 0.001$). All ethnicities demonstrated a statistically significant fall in the 'Unsure' responses, with the white population having the largest decrease at 31.0% ($p = 0.046$). There appeared to be a general post-interventional decrease in 'No' and 'Unsure' answers regardless of possession of an OD card. Consequently,

there was a corresponding increase in 'Yes' responses towards Question 2, which is a pattern observed in all previous subgroups.

Discussion

This study aims to explore the effects of an educational intervention aimed at Muslim communities around the UK delivered by healthcare professionals alongside local Imams and scholars, on perceptions towards religious permissibility for OD and willingness to register as a donor.

Our findings suggest a consistent post-interventional increase in the number of attendees considering OD religiously permissible (Figs. 1, 2). This trend presents in tandem with a post-interventional decrease in participants considering OD impermissible, were unwilling to register as a donor or were unsure of either. Figure 2 demonstrates the general shift in opinion post-intervention.

With regards to the first hypothesis pertaining the effect of religious uncertainty on willingness to register, it was found that most respondents were indeed unaware of the religious position on the matter, and religious concerns were cited as the foremost constraint amongst 73% of respondents. A strong emphasis on understanding Islam's position has been found in multiple studies (Tarabeih et al., 2022; Altraif et al., 2020). Compared to 1% of White families, 30% of Asian families cite religious beliefs as reasons for refusing to consent for OD (NHS Blood & Transplant, 2019). Amongst South Asian faith groups, Muslims demonstrated significantly less favourable attitudes to OD than their Sikh and Hindu contemporaries, with religious guidance deemed more influential to Muslims' decision-making (Karim et al., 2013). A global survey found that 69% of Muslims living in the West agreed with OD in principle but only 39% deemed it compatible with their religion (Sharif et al., 2011). A small proportion of our cohort did indeed believe OD was impermissible and were unwilling to register pre- and post-intervention, and a much smaller proportion shifted towards an objection of OD post-intervention. Although this is a valid and respected opinion within the corpus of Muslim scholarship and is to be accepted in the process of attaining informed consent, our study identified a much larger proportion of Muslims inclined initially towards uncertainty, the majority of whom shifted post-intervention towards an approval of OD. The results of this study corroborate the feasibility and positive impact of incorporating faith leaders in tackling religiously informed barriers.

Religiously tailored interventions can influence health behaviours at multiple levels of socio-ecological change due to the religion's influence on individual, social, organisational and environmental aspects of people's lives (Pratt et al., 2020). From the perspective of community-based participatory research (CBPR),

health promotion programs that address the multidimensional nature of health problems may be more complex to implement but are more likely to result in lasting behavioural change (Campbell et al., 2007). Involving local Imams and using local mosques can be an effective method to deliver health-based interventions to populations that are sometimes considered marginalised, hard to reach or who view traditional health care channels with distrust. Their involvement can help bring home controversial topics such as organ donation when community members observe such discussions occurring in the familiar environment of their local mosque or openly addressed by local faith leaders. This study successfully included imams as they represent an important part of the social fabric for British Muslims. Capitalising on the strengths of religious institutions and developing long-term partnership between public health bodies and local Muslim faith leaders may open avenues for multiple other targeted and effective health-based interventions associated with perceived religious barriers.

Nevertheless, religious concerns were found not to be the sole barriers to OD registration in this study. Post-intervention, there remained a large number still unsure or against registration despite the assumption that it was permissible in Islam (17.0 and 3.6% respectively). This emphasises that aside from religious concerns other anxieties remain pertinent. Another unexpected finding was that amongst the 45 respondents already in possession of an OD card, 12 were unsure of OD's religious permissibility, highlighting that for some religious uncertainty is not a barrier at all. Our educational interventions involved delivering some information on the technical processes and procedures of OD before delving into faith-based discussions. Our data suggests including such procedural and specialist information is important in motivating many Muslims. Healthcare professionals should not lose sight of this when conversing with Muslim patients and families.

With regards to our second hypothesis, our educational intervention created a significant increase in participant willingness to register. Overall, our intervention reduced uncertainty towards approval of OD. This is demonstrated in the statistically significant 25.8% increase in 'yes' responses to Question 2. This shift was generally found irrespective of age, gender or ethnic origin. The shift from 'unsure' before the intervention for questions 1 and 2 to more certainty and agreement with OD is demonstrated in Fig. 1. This large positive change suggests this is not an issue widely discussed amongst Muslim communities and that many of these communities remain in the pre-contemplation stage. Only 27.1% of respondents not carrying a donor card identified they had previously considered registering, and 53.6% indicated before the intervention that if OD was permissible they would be willing to register. The positive shift to 79% willing to register after the event, and the majority of the remaining respondents unsure rather than in opposition to registration,

highlights the substantial potential for similar OD campaigns amongst UK Muslims (Ali et al., 2020a).

Strengths, Limitations and Areas for Future Research

Strengths of this study include the large sample size and the use of a standard survey across multiple cities throughout the UK implying reproducibility and feasibility of future implementation. The primary limitation of this study is the lack of randomisation with the inherently open nature of the educational sessions, possibly resulting in a predisposition towards attendees with a high degree of uncertainty. Additionally, small sample sizes in certain subgroups (e.g. registered organ donors, White ethnicity) limit the generalisability of conclusions involving these groups. With multiple statistical analyses, the increase in familywise error rate across the reported statistical analyses was not controlled. Importantly, the translation of knowledge and attitudes to behaviour was not analysed in this study. Although there was positive movement post-intervention towards readiness to become an organ donor, and willingness to register matched views on permissibility, whether attendees later took action and signed a donor card (or did not opt out) is unclear and requires further follow-up. One study has previously shown only a small proportion of participants stating an intention to register actually do so at follow-up (Deedat et al., 2013).

There were some limitations in relation to study design and session content. Response rate could not be calculated as it was unfeasible to record the number of attendees. The programme was established and delivered by local volunteers; the lack of a fixed speaker panel produced a variability in quality of delivered content across locations. Though our questionnaire was self-administered, limiting the risk of responses being influenced by the interviewers, the fact that our questionnaire was not validated may have led to a misinterpretation of the results. Furthermore, the wording of the questionnaire was a limitation as a potential confounding factor. For example, Question 2 in Part A asked whether the participant would register for organ donation under the condition that it is religiously permissible, limiting the ability to extract independent conclusions on willingness to register.

Other possible improvements include broader demographic data collection to include data on education, income, employment, ownership of a driving license or years in the UK. Greater detail on perspectives is warranted such as willingness to accept an organ, views on live versus deceased donation and views on brain death.

Research on the opinions of Imams and local mosque leaders and the barriers to their involvement in health promotion and OD is lacking and is an area for future research–the only study on this issue included only three Muslim organisation leaders (Randhawa et al., 2010). Appropriate follow-up studies are essential to assess if these behavioural changes are actualised. Furthermore, it may be interesting to explore the specific barriers encountered by those who remain resistant to OD

post-intervention and improve the content or delivery of these sessions. As this education programme is ongoing, we will be able to address the limitations mentioned previously, improve on the methodology and ensure these sessions are delivered effectively to the targeted communities.

Conclusion

Our focussed local educational interventions produced a significant positive shift in opinion towards OD's religious permissibility whilst reducing uncertainty and highlighted the presence of obstacles to registration aside from religious perception relevant to discussions at home as well as the clinical setting. Our study confirms the importance of direct grassroots work and the employment of members of the local ethnic and medical community to discuss these topics. Further work and follow up is needed to evaluate long-term efficacy. With a shortage of transplantable organs, growing Muslim communities and the UK transition to an opt-out system, there is an increasing need for the input of local community leaders, healthcare professionals and faith leaders to provide the information necessary to deal with medical, ethical, religious and cultural concerns regarding OD and enable the formulation of an informed decision.

Appendix 1

Contents of the distributed questionnaire.

Part A - BEFORE the session

Your Age ..... Your gender: ◯ Female ◯ Male

Your Ethnicity: ◯ Bangladesh ◯ Pakistani ◯ Indian ◯ Arab ◯ White ◯ Other

Are you on the registry for Organ Donation (Do you carry an Organ Donor card?) ◯ Yes ◯ No

If No, have you ever thought to register for Organ Donation? ◯ Yes ◯ No

If you haven't registered or thought to do so, why do you think you have not done so?

_____

_____

Do you think that Organ Donation is: ◯ Halal (allowed) ◯ Haram (not allowed) ◯ Unsure

If it is Halal, would you consider registering for Organ Donation? ◯ Yes ◯ No ◯ Unsure

Part B - AFTER the session

Do you think that Organ Donation is: ◯ Halal (allowed) ◯ Haram (not allowed) ◯ Unsure

If it is Halal, would you consider registering for Organ Donation? ◯ Yes ◯ No ◯ Unsure

Author Contributions The research was conceived by Sharif Al-Ghazal. Saeed Ahmed, Sameer Ahmed, Amer Hamed and Salman Waqar contributed to the design of the study. Imadul Chowdhury, aided in interpreting the results and working on the manuscript. Eleftherios Gkekas and Tsz Yau Tiffany Tang performed the data analysis and interpretation. Omar Ali wrote the manuscript with support from Ahmad Ali, Eleftherios Gkekas and Tsz Yau Tiffany Tang. All authors had access to and verified the underlying data.

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Data Availability All data relevant to the study are included in the article or uploaded as online supplemental information.

Declarations

Conflict of interest None declared.

Consent to Participation Informed consent was obtained from all participants included in the study.

Ethical Approval Approval was obtained from the ethics committee of Newcastle University. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

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A Review of Interface Bonding Testing Techniques

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ABSTRACT

Interface bonding between asphalt layers has been a topic of international investigation over the last three decades. In this condition, many researchers created their techniques and used them to examine the characteristics of pavement interfaces. Test findings won't always be comparable to the lack of a globally standard methodology for interface bonding. Also, several kinds of research have shown that factors like temperature, the condition of the applied load, constructing material, and others impact surface qualities. The study intends to solve this problem by thoroughly investigating interface bond testing that might serve as a basis for a uniform strategy. First, a general explanation of how the bonding strength function works and how it affects the pavement is given. The construction of various setups is then examined, and their functions are contrasted, followed by an explanation of different interface bond test procedures according to loading situations. Based on previous findings, a concept for a systematic approach to a standard assessment of asphalt interface is proposed.

Keywords: Flexible pavement, Interface bond strength, Destructive tests, Non-Destructive tests.

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مراجعة لتقنيات اختبار الربط بين الواجهات

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الخلاصة

كان الترابط بين طبقات الأسفلت موضوع بحث دولي على مدار الثلاثين عامًا الماضية. في هذه الحالة، قام عدد من الباحثين بصنع تقنياتهم الخاصة واستخدموها لفحص خصائص واجهات الرصيف. من الواضح أن نتائج الاختبار لن تكون قابلة للمقارنة دائمًا مع الافتقار إلى منهجية قياسية عالمية لربط الواجهة. أيضًا، أظهرت عدة أنواع من الأبحاث أن عوامل مثل درجة الحرارة وظروف التحميل والمواد وغيرها لها تأثير على جودة السطح. تهدف هذه الدراسة إلى حل هذه المشكلة من خلال التحقيق الشامل في اختبار روابط الواجهة التي قد تكون بمثابة أساس لاستراتيجية موحدة. أولاً، يتم تقديم شرح عام لكيفية عمل وظيفة قوة الترابط وكيفية تأثيرها على الرصيف. يتم بعد ذلك فحص إنشاء الإعدادات المختلفة، ويتم تباين وظائفها، متبوعًا بشرح لإجراءات اختبار روابط الواجهة المختلفة وفقًا لحالات التحميل. تم اقتراح مفهوم لنهج منهجي لتقييم قياسي لواجهة الإسفلت، بناءً على النتائج السابقة.

الكلمات المفتاحية: الرصف المرن، قوة ربط الواجهة، فحوصات إتلافيه، فحوصات لا إتلافيه

1. INTRODUCTION

Pavement is a multilayered construction made up of various pavement materials for each layer. Pavement lifts must be connected so that the asphalt pavement acts as a monolithic structure; thus, vehicular and climatic loads are effectively transferred to the whole pavement **(Abbas and Al Mosawe, 2021)**. In flexible pavement distressing areas that need guidance, Performance loss may be caused by fatigue cracking, heat cracking, rutting, slippage, and moisture damage **(Abd and Qassim, 2017)**.

Sufficient bonding between asphalt layers reduces shear distortion, increases the elastic recovery performance, and reduces structural failure **(Boulangé and Sterczynskia, 2012)**; hence, a durable, flexible pavement may be anticipated. Pavement construction with multi-layers, particularly asphalt pavements, creates weak zones at the layer interfaces, resulting in a lower shear strength in these zones relative to the asphalt concrete mixture **(Alnuami and Sarsam, 2020)**. Due to construction issues, it is impossible to achieve complete bonding between parallel layers in real-world settings; as a result, the assumption of the full bond between the asphalt layers to analyze and design pavement is no longer invalid **(Diakhate et al., 2007)**. Previous research indicates that a poor link at one interface may result in an anticipated loss of 40-80% and as little as 15% of the pavement's life **(Albayati, 2018)**. Inadequate Interface Bond Strength **(IBS)** may also increase the asphalt pavement deformation, driving conditions are affected, the road surface maintenance expenses rise, early distress like slippage is eventually brought on, and surface cracking on the top and bottom. **(Mohammad et al., 2009; Vaitkus et al., 2011)**. Bond failure along pavement layers appears to be influenced by certain contributing elements **(Canestrari et al., 2013)**: low compaction of the layers, including the subgrade layer, subbase layer, or base layer, base layer segregation, the type of the bitumen used for the surface layer, the weather at

construction, contamination of the subsurface, moisture presence between the layers, and an insufficient tack coat application are all factors that can affect a base course.
To assess the status of IBS, several organizations and institutes have created their test techniques and technology **(Raab and Partl, 2004a)**. Notwithstanding these attempts, no standard test technique or process has been established. In this manner, though, rudimentary efforts have been made **(Raab, 2011)**.
This effort aims to provide a standardized method for IBS testing. First, existing test approaches and techniques are described to evaluate IBS. Second, each test method's key component will be explained, followed by a demonstration of several settings created for each method. Following that, a discussion is accomplished about IBS testing equipment with various operations and their benefits and drawbacks. Also, the outcomes of certain of these testing equipment are compared in accordance with earlier research.

2. EVALUATION TECHNIQUE FOR INTERFACE BONDING TESTS

In this part, we'll discuss the many testing methods and procedures that may be used to evaluate interface bonding. **Fig. 1** shows the typical loading conditions that pavement layer interfaces experience in real-world situations: pure shear, pure tension, shear compression, and shear tension **(Rahman et al., 2017).**

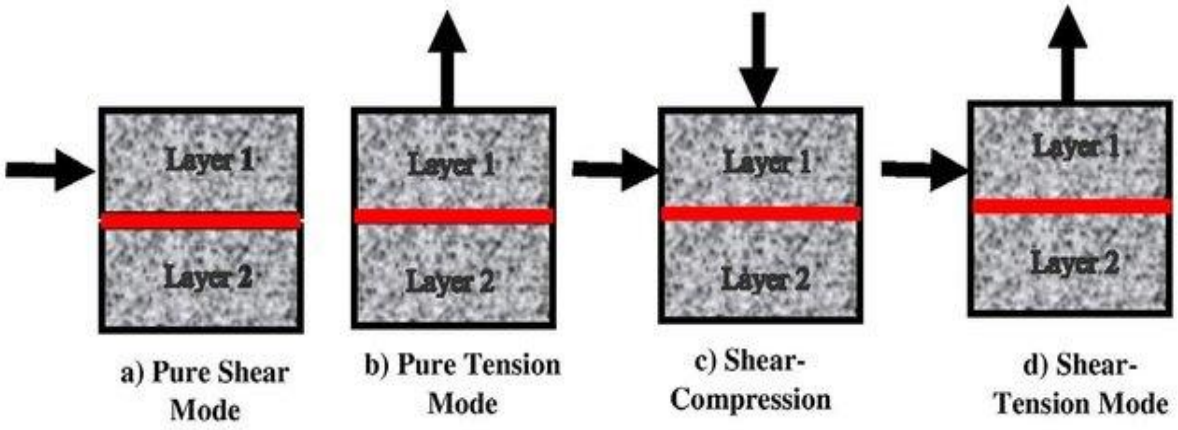

Figure 1. Variations in loading type at the pavement layers **(Rahman et al., 2017)**

Pure shear mode is commonly produced at interfaces without joints by temperature- and/or traffic-induced shear stresses transversely or longitudinally. Pavement with Portland cement concrete with an overlay layer of a hot mix asphalt, type 2 loading may be seen. Finally, the interface below a surface layer, where the IBS is relatively simple, may experience the shear-tension mode. The second circumstance, meanwhile, is uncommon in true pavement construction **(Sutanto, 2009; Al-Qadi et al., 2009)**. Using the previous discussion, many categories may be formed for the present test methodologies, as shown in **Fig. 2**. A certain type of test process is chosen based on the
The problem is how it is expected to be loaded and how accurate and repeatable it is **(Raab, 2011)**. The next sections will provide a detailed explanation of each testing technique category along with the pertinent most popular instruments. Notice that the following categories might be used to group all authorized test methods:
• The Destructive tests

• The non-destructive tests (NDT) on constructed roads which include some tests like the Falling Weight Deflectometer (FWD) test, Ground-Penetrating Radar (GPR), and infrared thermography.

Fig. 3 shows a schematic representation of a destructive interface bond testing equipment.

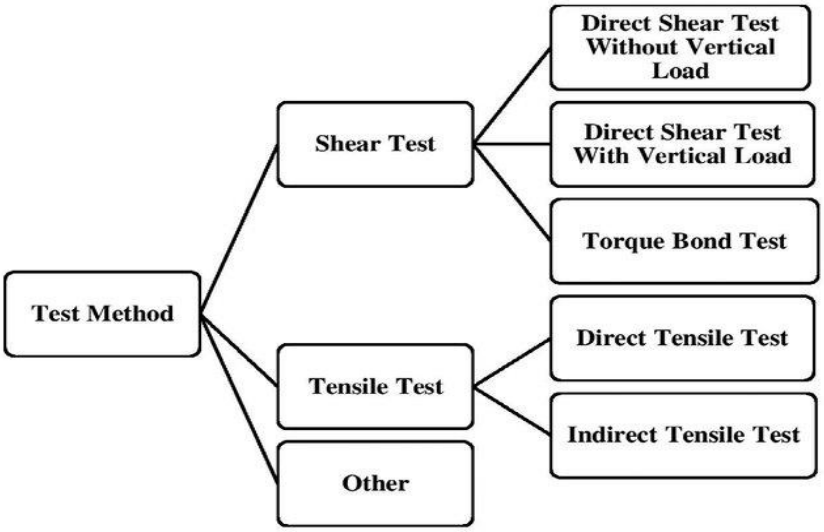

Figure 2. Techniques of testing interface bonding **(Rahman et al., 2017)**

2.1. The Shear Test

The shear test can be subdivided into two categories:

2.1.1. Direct Shear Test (including or not including normal load)

Due to its easy operation and adaptability, the direct shear test is considered the main method for evaluating the IBS. Shear testing in soil mechanics is where the creation of shear testing equipment began, and throughout time, several nations and labs designed and constructed their machines **(Raab et al., 2009)**. Al-Qadi developed the Direct Shear Test Fixture, which seems useful in determining the IBS. The test calculates the values of a direct shear load and their subsequent displacement. The IBS values are computed by fracturing the average shear stress by the bonded cross-sectional area.

The start of using a standard shear test machine was from the Karlsruhe University in Germany. They made a shear system that could be attached to a universal test machine. Even though this system could only be used for static testing and it wasn't possible to apply a normal force, it was updated and used by many other countries. It was still one of the best ways to test the bonds between layers.

Measuring the maximum shear load and corresponding displacement is necessary to evaluate interfacial bonding properties. These are useful in determining how appropriate a given material is to be used in tack coating. Specimens of (6 in) diameter were cored from a laboratory compacted composite (12in × 12in width, 2.8in height). Shear loads are added vertically to a specimen of two layers using a controlled strain mode with a set rate of 2 in/min at 21.1°C temperature till damage is observed **(Al-Qadi et al., 2009)**.

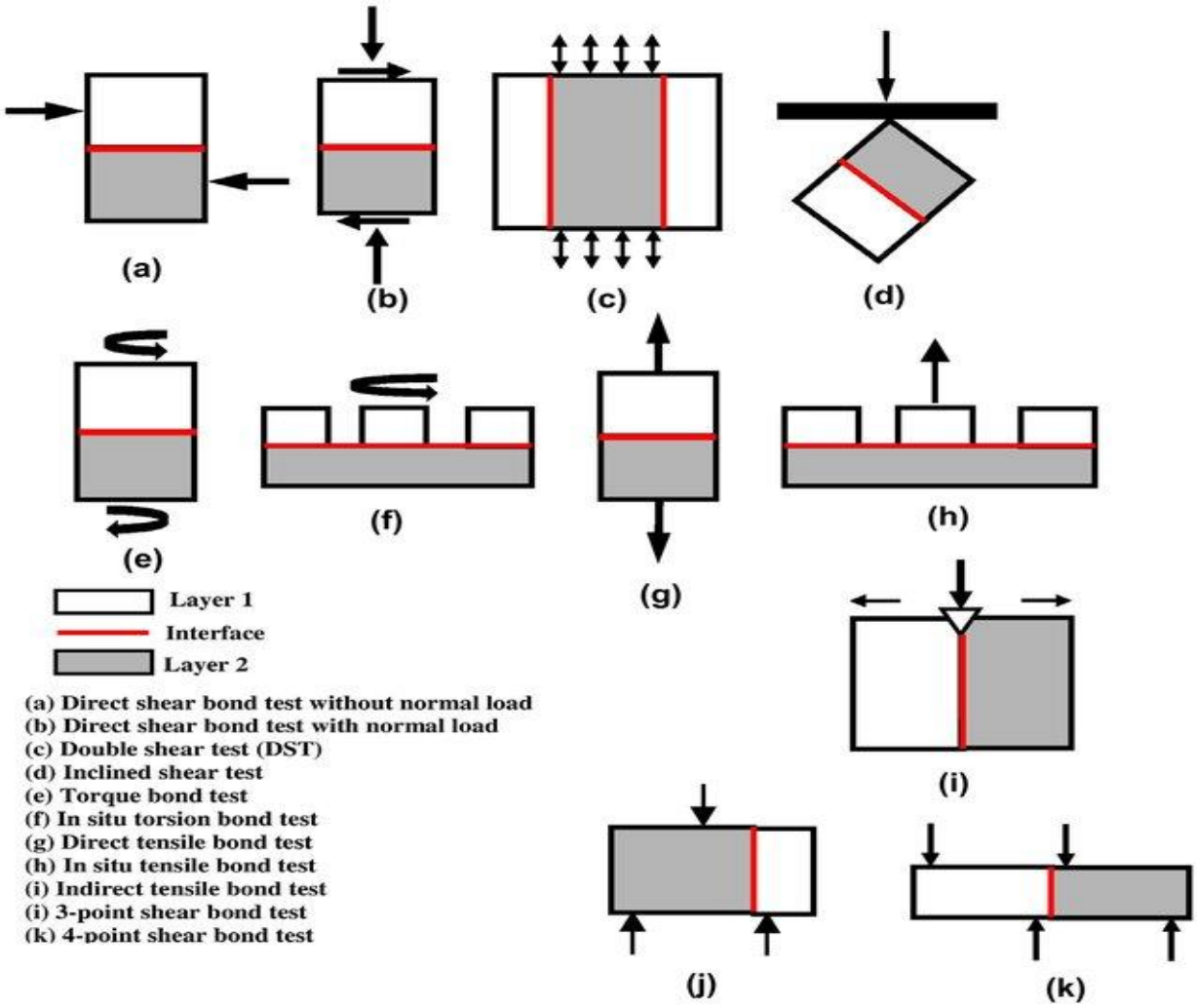

Figure 3. Graphical depiction of several contact bonding test procedures **(Rahman et al., 2017)**

The layered Parallel Shear test (LPDS) devise illustrated in **Fig. 4 (Raab et al., 2009)**. The measurement of the nominal average shear stresses and maximal shear stiffness is needed in determining the inlayer and interlayer shear characteristics of asphalt concrete. The former is useful in evaluating the quality of the mixture, whereas the latter is required to assess tack coat features. A shear load is added vertically upon composite specimens with strain control mode at a fixed speed. The cylinder-formed composite specimen has a 3.94 in diameter and could be either lab-fabricated or pavement-cored and requires to be glued.
The Florida Department of Transportation (FDOT) suggested a simpler and directly applicable shear device for measuring the IBS to evaluate tack coat performances. The application of shear load vertically on the double-layered asphalt concrete samples continues with controlled strain mode, with a steady rate of 2.0 in/min at 25°C until specimen failure is achieved. The cylindrical samples have a diameter of 6-in and may be either lab-fabricated or excerpted from roads with no need for trimming to suit the device itself. The gap of 0.19-inch width between shear plates is shear strength at the moment of failure, as shown in **Fig. 5 (Sholar et al., 2004)**. **Table 1.** Lists a few well-known direct shear testing apparatuses without applying typical stress.

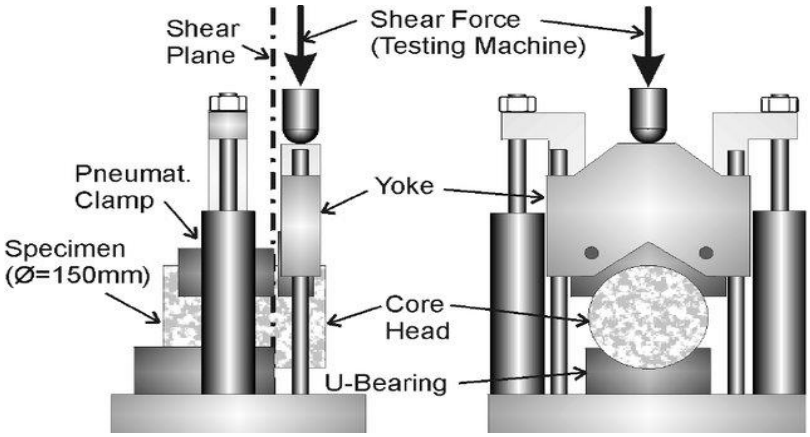

Figure 4. LPDS Apparatus **(Raab et al., 2009)**

Figure 5. FDOT bond strength device **(Sholar et al., 2004)**

Table 1. Devices for Direct shear test without vertical load

Device name	Reference
The modified letter	**(Vaitkus et al., 2011)**
Layer-parallel direct shear (LPDS)	**(Raab and Partl, 2004a)**
Superpave shear tester (SST)	**(Mohammad et al., 2002)**
Louisiana interface shear strength tester (LISST)	**(Mohammad et al., 2009)**
Florida department of transportation (FDOT) shearing test	**(Sholar et al., 2004)**
Direct shear testing	**(Yildirim et al., 2005)**
Modified compact shearing (MCS)	**(Diakhate et al., 2006)**
Double shear test (DST)	**(Diakhaté et al., 2011)**
The shear test mold	**(Uzan et al., 1978)**
Virginia shear fatigue test	**(Donovan et al., 2000)**
Laboratory bond interface strength device (LBISD)	**(Woods, 2004)**
The shear strength test	**(Vacin et al., 2005)**

The impact and application of normal stress, which simulates an actual wheel load, on interlayer bond strength have been hotly debated in the literature up to this point **(Tozzo et al., 2014)**. As a result, several researchers created direct shear test equipment that included normal load application. **Table 2** provides a number of direct shear test equipment with potential normal load applications.

Table 2. Devices for Direct shear test with vertical load

Device name	Reference
Sapienza inclined shear test machine (SISTM)	**(Tozzo et al., 2014)**
Sapienza horizontal shear test machine (SHSTM)	**(D'Andrea et al., 2013)**
Sapienza direct shear testing machine (SDSTM)	**(Tozzo et al., 2014)**
Louisiana interface shear strength tester (LISST)	**(Mohammad et al., 2009)**
Ancona shear testing research and analysis (ASTRA)	**(Santagata and Canestrari, 1994)**
Direct shear device	**(Chen and Huang, 2010)**
Shear fatigue test	**(Romanoschi, 1999)**
National Center for Asphalt Technology (NCAT) bond strength device	**(West, 2005)**
Superpave shear tester (SST)	**(Bognacki et al.,2007)**
Interface shear testing device (ISTD)	**(Al-Qadi et al., 2012)**

Using IBS data without ordinary restriction results in an overdesigned layer of pavement, which might be relevant only for tack coat QC/QA considerations, according to an investigation by **(Karshenas et al., 2014)** on the significance of normal confinement to shear bond failure; other research works in a related field of study have been found **(Santagata and Canestrari, 1994; Mohammad et al., 2009; Piber et al., 2009)**.
However, owing to their straightforward operation, versatility, and straightforward procedure for producing specimens, direct shear tests without a normal load are extensively utilized across the globe **(Collop et al., 2003; Sholar et al., 2004)**.

2.1.2. The Torque Bond Test

Torque bond tests may also be used in the evaluation of the IBS. The method development was in Sweden. Later, the British Board of Agreement (BBA) accepted it as an approved methodology for thin surfacing systems **(BBA, 2013)**. This methodology is applied for assessing the IBS between two layers: the surface layer, which must be thin, and the binder layer, which is a normal asphalt layer in the field or the lab, by determining the maximum shearing torque at any temperature. Using a portable torque wrench, tension is subjected to a plate that is adhered to the core surface until the bond experiences a twisting shear failure or a torque of (300 N.m) is reached **(BBA, 2013)**.
The results of experimental experiments demonstrate that the traditional torque bond test has a number of drawbacks:
1. Constant specimen size,
2. The topmost pavement contact is the only place where it is often relevant in the field,
3. Due to manual operation, the torque rate is inadequate,

4. Abnormal axial bending,
5. Applying pressure to twist off the surface **(Collop et al., 2011; Sutanto, 2011)**.
As a result, some researchers have created their apparatus. In the literature, several utilized torque bond test devices are listed in **Table 3**.

Table 3. Devices for torque bond test

Device name	Reference
Manual torque bond test	**(BBA, 2013)**
Laboratory-based manual torque bond test	**(Diakhate et al., 2007)**
Automatic torque bond test	**(Sutanto, 2009)**
Tack coat evaluation device (TCED)	**(Woods, 2004)**
In Situ torsion shear test	**(Diakhate et al., 2007)**
Monotonic torque test	**(Diakhaté et al., 2011)**

(Choi et al., 2005) modified a manual torque bond test in a lab, which allows testing at different temperatures in addition to the shear strength of any contact of interest. Yet, there were unresolved restrictions with the newly built technology. Researchers at the University of Nottingham **(Collop et al., 2011)** created an automated, regulated torque bond apparatus to address the existing problem and undertake semi and repetitive load interface testing. The device transfers the vertically subjected stress or displacement and turns it into torque, depending on the rack and pinion mechanism.
Several studies were conducted **(Sutanto, 2011)** to compare the automated torque bond test findings with the manual torque bond test. The results show that the manual torque bond test has a greater Coefficient of Variability (COVs) than the automated torque bond test. Moreover, the automated bond test yield findings showed an increment of 20–30% compared to the manual test, maybe because of the manual device's shortcomings.

2.2. Tensile Test

2.2.1. The Direct Tensile Test

Tensile and shear failure between two bonded layers may occur due to vehicular or environmental factors, as was previously discussed. Thus, it is crucial to measure the tensile IBS. Tensile tests are test techniques that can measure failure by highlighting the weakest point in the testing system and assessing the tensile bond between a couple of adherent layers of asphalt at the site or in the laboratory **(Xiao et al., 2015)**. **Table 4**. lists several frequently used direct tensile test equipment.
Pull-off tests can be considered prevalent tensile tests since they are simple to conduct in the field. The pull-off test is typically performed by physically applying a torque or tensile force on tack-coated surfaces via a shaft or nut and computing the tensile strength. The American Society for Testing and Materials (ASTM) (ASTM, 2014) devised a recommended test methodology to measure the tension necessary to separate two bonded layers.
Conventional direct tensile testing equipment, such as the ATacker and UPOD devices, is controlled manually. This might cause the plate to be pulled off at a non-uniform rate and have eccentric loading effects, making the results unreliable. To deal with this problem, the Louisiana Tack Coat Quality Tester (LTCQT) was created through the study of **(Mohammad**

et al., 2012) as a way to test the quality of a tack coat that has been applied in the field and to compare how different tack coat materials react.

Table 4. Devices for direct tensile test

Device name	Reference
Tack coat evaluation device (TCED)	**(Woods, 2004)**
UTEP pull-off device (UPOD)	**(Eedula, 2007)**
Interface bond test (IBT)	**(Hakimzadeh et al., 2012)**
Modified pull test	**(Xiao et al., 2015)**
Pull-off test device	**(Raab and Partl, 2004b)**
Schenck-Trebel test	**(Litzka et al., 1994)**
Tensile test	**(Santagata and Canestrari, 1994)**

As shown in **Fig. 6 (Ghabchi et al., 2018)**, the LISST system assessed the ISS of test specimens made at different application levels, both with and without tack coats. The calculated ISS values were evaluated for the optimal application rate for different surface types of tack coats and for testing the tack coat resistance to varying conditions at the site. The LISST system consisted of two attachments, as one of these fixtures can move parallel, whereas the other stationary jaw moves up and down (moving jack). After setting the double-layered asphalt sample in the LISST device, the moving jaw was loaded vertically, parallel to the interface of the asphalt layers, to establish shear stresses in the preexisting interlayer. The load application was increased until interlayer failure was observed. A loading frame developed by materials testing systems (MTS) was used in this research by applying load within the LISST device to the sample. Additionally, the prototype was used to record the axial forces at displacement. IBS values were calculated by dividing the maximum axial load at fault by the sample cross-sectional area.

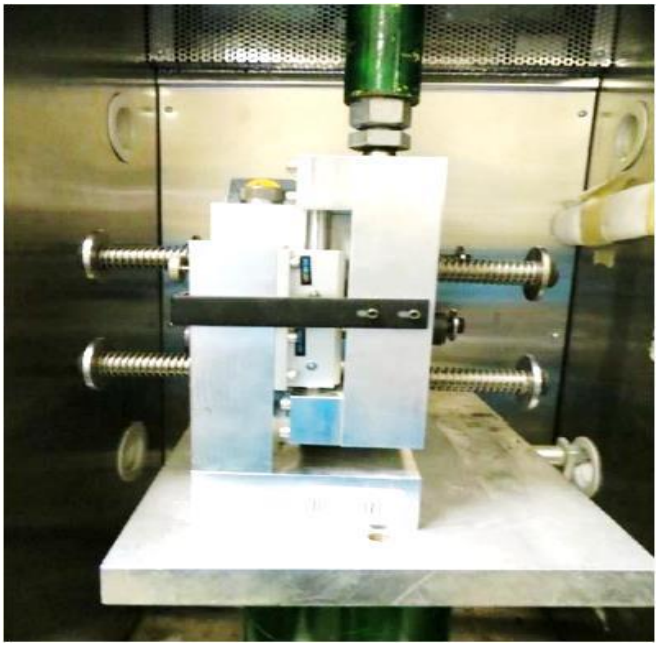

Figure 6. LISST interlayer shear strength **(Ghabchi et al., 2018)**

2.2.2. Indirect Tensile Test

Despite its popularity and simplicity, the pull-off test technique has a variety of drawbacks. For example, a single measurement shows a disability to characterize the bond dissociation of materials represented as flexible or fragile attitude, and the findings are highly dispersed due to human operation. The wedge splitting test is a modern indirect tensile test technique that **(Tschegg et al., 1995)** developed to overcome these problems. A thin wedge is subjected to the interface of a double-layer sample under the condition that the horizontal element of the applied force keeps layers apart.

Fig. 7 (Tschegg et al., 1986) illustrated the maximal horizontal stress **(F_m)** and specific fracture energy **(GF),** whose determination is significant in characterizing the fracture mechanical behavior of layer bonding. This factor is essential in determining how appropriate the material will be used in tack coating. Using a wedge, the load is applied vertically to the two-layer sample with a groove and starter notch along with the interface at a steady rate until the sample is separated. The samples take the form of a cube or cylinder, with the start notch in the middle interface, and may be either produced in a laboratory or taken from the field.

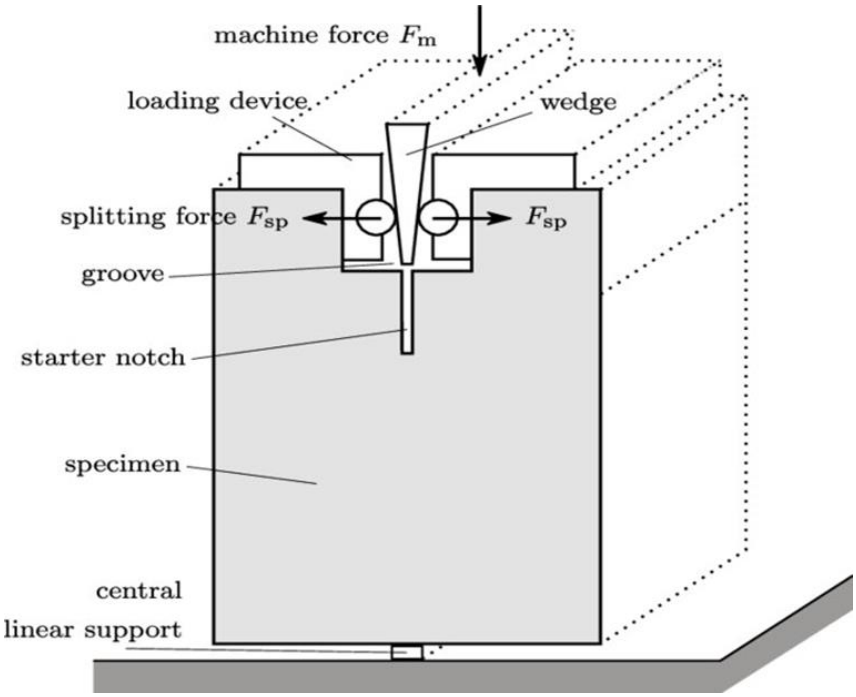

Figure 7. Wedge Splitting test **(Tschegg et al., 1986)**

3. DISCUSSION ON IBS TESTING EQUIPMENT

Many academics have conducted in-depth studies over the last several decades due to the importance of interface bond assessment. While examining interface qualities, one should remember that Raab and Partl claimed that surface layer adhesion under operational circumstances is susceptible to tensile and shear modes.

Several European nations, the US, Canada, and others have created and implemented their interface bond testing techniques and tools in recent years **(Raab and Partl, 2004b)**.

The ASTRA component conformed with European and Italian standards **(Pasquini et al., 2014)**, the BBA suggested the torque bond test, the pull-off test was confirmed in the ASTM,

and recently, the LISST technique was authorized as a standard evaluation for assessing the IBS by AASHTO.

Yet, the results of the experiments show that each of these test methods and equipment has advantages and disadvantages, which are discussed below. The introduction of the Leutner device was made in subsection 2.1.1. Study shows that the device has several flaws, including non-uniform IBS stresses, no normal stress being supplied to the surface layer, and no space between the shearing rings. Furthermore, **(Collop et al., 2003)** noted that the test findings are rather unpredictable.

The lack of space between the shear platens in the classic Leutner shear test caused the interface to be misaligned with the shear plane, particularly for specimens containing inconsistent interfaces. To find solutions, (**Choi et al., 2005)** originally implemented a 5 mm gap in the UK and said the tests would benefit from it. The supplementary investigation also showed that the findings' degree of variability was reduced when a 5 mm gap was included in the shear plane **(Collop et al., 2009)**. Moreover, **(Raab et al., 2010)** ran an experimental attempt to understand the function of the gap more fully. The study's findings indicated that the gap width affected the interface shear outcomes, and other research with comparable designs supports these findings **(Sholar et al., 2004)**. Generally, a gap width only slightly wider than 0 mm would be sufficient to streamline and improve the testing.

The LPDS test created by the EMPA is considered an improved edition of the Leutner test, and its most benefits found are as follows **(Raab and Partl, 2009; Kim et al., 2011)**: higher flexibility in geometry, the distribution of stress that may be uniform, and an easy-to-use instrument for quality assurance testing and post-construction surface evaluation. In addition, LPDS has several disadvantages, such as neglecting the overall effect of horizontal and vertical stresses as well as dilatancy and eccentricity effects, the limited temperature at testing and the thickness of specimen due to the effect of the "snow plow", and producing inconsistent results at extremely high temperatures.

Researchers often employ shear box-type experiments as shear and normal loads occur at the interface. Nevertheless, there are a few flaws in this test methodology. The lack of complementing shear stresses causes the shear stress distribution on the interface to be non-uniform, according to **(Kruntcheva et al., 2006). (de Bondt, 1999)** later introduced a four-point shear test configuration to address the issue. In addition, it is important to examine the experimental complexity linked to applying normal and shear stresses. In conclusion, the gadget may be useful, especially for research reasons, but a more straightforward method is required for actual field assessments of interface qualities.

Even though experimental results for both devices were comparable in an investigation made by **(Kim et al., 2011)**, a comparison in testing methodology between shear box and LPDS showed that the shear stress-deformation curve for both tests was completely different because of the varied shear scheme and stress conditions imposed during testing. Identical results have also been achieved elsewhere **(Tozzo et al., 2014)**.

Many theoretical and experimental studies have been conducted to date in the research to assess the outcomes of various interface bonding devices while considering variations in testing parameters, including failure mode, setup configuration, geometry, and other factors. Several of these researches are emphasized in the sentences that follow. **(Deysarkar, 2004)** performed research utilizing many instruments, including the ATAKER (shear and tension-type), the UTEP torque test, the KMC shearing device, and the UTEP pull-off device (UPOD). The findings showed that tension mode setups, regardless of the surface studied, could more accurately detect the quality of one tack coat. In an experimental study, **(Tashman et al.,**

2008) investigated the impact of construction parameters on the bond strength at the interface between pavement layers. The three test methods are the UTEP pull-off test, the torque bond test, and the FDOT shear tester. The results showed that debonding at the interface brought on by stress conditions seemed better simulated by the FDOT shear tester. The findings of the UTEP pull-off test were usually dissimilar from those of the other two tests, whereas the results of the torque bond test were congruent with those of the FDOT shear tester.

4. CONCLUSIONS

This work discussed and reviewed IBS testing in pavement layers to develop a widely used standard approach for an in-depth comprehension of interface characterization and assessment. The following conclusions might be made in this regard:

- The absence of worldwide consensus about test methodologies, protocols, and assessment standards has led to substantial diversity and sometimes contradictory results in the literature.
- Any effort to standardize the bonding assessment of pavement layers should consider the competing interests of researchers and highway builders. Researchers need an accurate and efficient technique, while road contractors and agencies need it quick and easy to use.
- Under in-service circumstances, it is possible for the bonding between neighboring layers to break in both shear and tension modes, which should be considered.
- The validity of the results collected via a standardized test procedure is primarily determined by its repeatability and reproducibility.
- To standardize a test technique, it is essential to consider how various test parameters and situations affect interface bonding qualities and how these numerous significant aspects interact.

NOMENCLATURE

AST	Advanced Shear Tester	LISST	Louisiana Interface Shear Strength Tester
ASTM	American Society for Testing and Materials	LPDS	Layered Parallel Shear Test
ASTRA	Ancona Shear Testing Research and Analysis	LTCQT	Louisiana Tack Coat Quality Tester
BBA	British Board of Agreement	MCS	Modified Compact Shearing
COVs	Coefficient Of Variability	MTS	Materials Testing Systems
DST	Double Shear Test	NCAT	National Center for Asphalt Technology
FDOT	The Florida Department of Transportation	NDT	Non-Destructive Tests
FWD	Falling Weight Deflectometer	SDSTM	Sapienza Direct Shear Testing Machine
GF	Specific Fracture Energy	SHSTM	Sapienza Horizontal Shear Test Machine
GPR	Ground-Penetrating Radar	SISTM	Sapienza Inclined Shear Test Machine
IBS	Interface Bond Strength	SST	Superpave Shear Tester
IBT	Interface Bond Test	TCED	Tack Coat Evaluation Device
ISTD	Interface Shear Testing Device	UPOD	UTEP Pull-Off Device
LBISD	Laboratory Bond Interface Strength Device		

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In Practice

‘Community reporting’: an insight-generating approach for local authority physical activity provision

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INTRODUCTION

Research into physical activity (PA) promotion often takes a top-down approach, meaning that it overlooks the experiences of local people.[1] Recently research has acknowledged the importance of community-informed research as critical for understanding local contexts and for exploring health disparities and inequalities.[2] Community insights are important for shedding light on how intrapersonal factors (e.g. self-concept), dynamic interpersonal relationships (e.g. friends, colleagues) and the local environment (e.g. parks and green spaces, workplaces) can influence PA both independently and in combination with other factors.[3] However, community insights are often elusive using traditional research methods which typically involve interviews[4] or focus groups.[5] The potential of such methods is often undermined by local people being guarded about discussing personal and/or sensitive information with someone outside of their community.[6]

Previous literature highlights the challenges facing ‘out-group’ researchers – individuals regarded as ‘different’ due to their education, research expertise, race and/or socioeconomic status that may denote a more elevated privilege and power within society.[7] While ‘out-group’ researchers may be objective and emotionally distant from the research process, they may find it difficult to gain access to research participants.[8] ‘Out-group’ researchers may lack underpinning local knowledge, which often reduces empathy and the potential for research participants to experience the psychological safety needed to disclose their experiences.[9]

Previous literature highlights the challenges facing ‘out-group’ researchers – individuals regarded as ‘different’ due to their education, research expertise, race and/or socioeconomic status that may denote a more elevated privilege and power within society

In light of these potential shortcomings, this article presents a novel approach to gaining community insight called ‘community reporting’ (CR). CR can provide an opportunity to engage with local residents who may otherwise be reluctant to share their experiences with ‘outsiders’. It is essential these experiences are captured to help develop case study examples to inform policy recommendations and action when creating healthy environments. This approach can go beyond being just ‘practical examples’ and instead influence decision making and, by using local context, can help to convince decision makers.[10]

IN PRACTICE

Case study: Active Calderdale

Drawing on the insight-gathering work of the Sport England funded Local Delivery Pilot (LDP) ‘Active Calderdale’, which is using a whole-systems approach to PA promotion across the Borough, CR was identified as a functional and sensitive approach. CR was piloted in one locality to develop an understanding of the key organisations and services that were influential in directing PA behaviour. To maximise learning, the CR approach was one of a number of innovative approaches used within the larger evaluation and insight work of Active Calderdale. This process was instigated and delivered by an embedded researcher (AP) within Active Calderdale.

Identifying community reporters

Following institutional ethical approval, community reporters were recruited through a Community Engagement Coordinator (CEC) who works for a local community anchor organisation

partnered with Active Calderdale. Using their local knowledge, the CEC identified residents who were not only actively involved with community-based initiatives but also well connected to residents with limited social networks. These residents were approached individually to engage in the task.

Workshops to train community reporters

A workshop was used to train the Community reporters, which took a four-step approach to the training:

1. Introduction (30 min)

The Community reporters were briefed on Active Calderdale and the insight-gathering task. This involved presenting the aims of Active Calderdale, the aims of the insight-gathering task and the proposed approach. The Community reporters had time to discuss Active Calderdale and ask any pertinent questions (e.g. how will the information gathered from this task be used?); it was important they fully understood the strategy and the task before proceeding.

2. Training and ethical considerations (30 min)

Next, AP familiarised the Community reporters with the conversation brief to be used with residents. It was important that these conversations were unstructured and followed the flow of conversation, rather than following a set agenda. They were encouraged to revert to the brief when conversation was beginning to tire. For example, topics pertinent to this project are related to (1) daily, weekly and monthly contacts to understand key influencers (e.g. can you tell me about who you speak to on a daily basis in the community?), (2) methods of travel in the area (e.g. can you tell me how you get to your local shop?) and (3) weekly work and/or leisure schedules (e.g. can you talk me through what your working week looks like?). To illustrate how the conversation might progress, AP and the CEC engaged in a role-play task. The Community reporters were also made aware of key ethical procedures that required adherence, such as confidentiality, the process of gaining consent and information about the location of each conversation.

3. Practice (45 min)

An essential part of the workshop was ensuring the opportunity to become fluent using the conversation brief. Community reporters took turns using the brief with fellow Community reporters, receiving constructive feedback from AP, the CEC and the other Community reporters in the group. Feedback typically revolved around how to initiate (e.g. can you tell me about local community groups you engage with?), develop (e.g. can you tell me a bit more about that?) and build (e.g. that's interesting, do you notice other people in the community who influence your behaviour?) on the conversation. Rounds of practice conversations offered Community reporters the opportunity to refine their skills and approach until we were all comfortable with the task.

4. Final review and distribution of conversation materials (15 min)

The Community reporters had the opportunity to ask questions before being given information sheets, a link to the online consent form and a Dictaphone. Contact details for AP and the CEC were also provided, and AP ensured the Community reporters were competent in collecting stories and addressed any final questions.

Anecdotal reflections

This CR approach generated important insights on local PA provision. For example, we discovered how small changes would expand the numbers of South-East Asian women using leisure provision and the importance of providing female deliverers of a similar cultural background to engage these women (e.g. by having only women lifeguards present at women only swimming sessions). Furthermore, the Community reporters revealed the importance of day-to-day social processes and how the essential role social networks play in validating involvement in PA (e.g. local parent groups organising postschool drop-off walking or running groups). Activating these social local influences will be essential when considering locally driven PA provision.

CONCLUSION

In this article, we introduce and describe CR as an approach to gaining insight on local context from local residents. This may be useful for researchers, evaluators and practitioners working to understand local contexts and underserved groups. The CR approach offers an opportunity to work with community-based individuals to generate insights into local priorities and concerns. These issues can help address inequalities and should be considered by those who devise policies and strategies, and those working on delivering PA provision.

The CR approach offers an opportunity to work with community-based individuals to generate insights into local priorities and concerns

DECLARATION OF CONFLICTING INTERESTS

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Exploring the fast food and planning appeals system in England and Wales: decisions made by the Planning Inspectorate (PINS)

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Abstract

Background: The National Planning Policy Framework advocates the promotion of 'healthy communities'. Controlling availability and accessibility of hot food takeaways is a strategy which the planning system may use to promote healthier environments. Under certain circumstances, for example, local authorities can reject applications for new hot food takeaways. However, these decisions are often subject to appeal. The National Planning Inspectorate decide appeals – by upholding or dismissing cases. The aim of this research is to explore and examine the National Planning Inspectorate's decision-making.

Methods: The appeals database finder was searched to identify hot food takeaway appeal cases. Thematic analysis of appeals data was carried out. Narrative synthesis provided an overview of the appeals process and explored factors that were seen to impact on the National Planning Inspectorate's decision-making processes.

Results: The database search identified 52 appeals cases. Results suggest there is little research in this area and the appeals process is opaque. There appears to be minimal evidence to support associations between the food environment and health and a lack of policy guidance to inform local planning decisions. Furthermore, this research has identified non-evidence-based factors that influence the National Planning Inspectorate's decisions.

Conclusion: Results from this research will provide public health officers, policy planners and development control planners with applied public health research knowledge from which they can draw upon to make sound decisions in evaluating evidence to ensure they are successfully equipped to deal with and defend hot food takeaway appeal cases.

INTRODUCTION

Literature review

Links between planning and health

In recent years, there has been a significant move to reunite planning and health in England.[1] This has been closely associated with two key changes at a national level. In terms of planning, the National Planning Policy Framework (NPPF) makes explicit the need to promote healthy communities, including issues such as 'access to healthier food'.[2,3] Furthermore, the Health and Care Act transferred responsibility for public health to upper-tier local authorities.

The UK planning system, however, is designed to reconcile the many, often conflicting, interests that are inherent in the development of land. As such, control of development is not as central to planning in the UK as might be assumed, and key principles of negotiation, mediation and discretion come into play. At local-level, plans, generically termed the 'Development Plan' for the area, comprising the Local Plan, any neighbourhood plans and other spatial strategies, are required to be in general conformity with the NPPF. The suite of plan documents guide development but are not a 'blueprint' for what will and will not happen. Moreover, while there is primacy of the

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Development Plan, other 'material considerations' will be taken into account in all planning decision-making.

Evidence that urban planning is implicated in contemporary health problems has existed for some time. In relation to obesity, for example, the Foresight report *Tackling obesities, future choices*[4] highlighted the emerging evidence around the built and food environments.[5] Moving forward, guidance and Supplementary Planning Document (SPD) documentation is now emerging which hopes to provide practical support for local authorities who wish to use the planning system to address public health issues such as obesity.[6]

Neighbourhood food environments and hot food takeaways

The environments in which we spend our daily lives influence what, when and where we choose to eat. This can be further broken down into five issues of availability, accessibility, affordability, acceptability and accommodation.[7] Clearly some of these issues are out with the scope of the planning system, but availability and accessibility are issues, which at least to some extent, the system has control over. Access and availability of food for both home and out-of-home consumption might be defined as the neighbourhood food environment, a combination of retail outlets (from small shops to supermarkets) as well as cafes, takeaways and restaurants.[8] In England, food outlets fall into different categories in terms of urban planning (see below); however, only hot food takeaways (HFTs) have their own specific category; therefore, the review of evidence focuses on this category of outlet. One issue that is important to consider is total exposure to fast-food availability, in other words the environments where we work, or go to school and those we travel through in our daily lives as well as where we live.[7,9]

Evidence suggests that individuals do not make informed decisions regarding the healthfulness of food.[10] There are a complex synergy of determinants which surround food choice, of which the environment and proximity to HFTs are contributing factors.[11] Residing within areas which are abundant in HFT outlets increases the likelihood of individuals accessing unhealthy food.[12,13] In addition, those who make purchases from HFTs are also more likely to do so on a frequent basis.[11,14–16] Overcoming obstacles, such as distance to make HFT purchases, is becoming more common, particularly in young adults. Recent studies carried out with secondary school-aged children in both London and Newcastle upon Tyne indicated that young people reported travelling significant distances within school lunch breaks to obtain an HFT meal from their preferred establishment.[14–16] Taxi and bus rides were stated as a means to facilitate consumption of such purchases and illustrate the lengths some will go to, in order to acquire the food they desire, irrespective of health consequences.

Reviews of takeaway fast-food access have been somewhat equivocal, with some studies finding a significant relationship between access and diet, while others have failed to do so.[11,17,18]

One aspect that seems to attract broad consensus among researchers is around takeaway food, nutrition and social deprivation. Food served within takeaways tends to be nutritionally poor and energy dense.[19] Research has also shown that takeaway outlets cluster in areas of social deprivation[20,21] and of concern the trend of socioeconomic disparity and in takeaway food outlet density seems to be increasing.[20] Moreover, research on socioeconomic status (SES) and fast-food consumption suggests that there is an exaggerated impact on lower SES groups from exposure to fast-food outlets. In this study, lower SES groups consumed more fast food, tended to have higher body weight and were more likely to be obese.[22]

Analysis of cross-sectional data from the UK National Diet and Nutrition Survey (2008–1012) explored the frequency and socio-demographic correlates of eating meals out and takeaway meals at home. Results indicated that one-fifth to one-quarter of individuals ate meals that were prepared out of home on a weekly basis. Moreover, the proportion of participants eating both meals out and takeaway meals at home at least weekly increased considerably in young adults (aged 19–29 years). In addition, in adults, affluence was positively correlated with consumption. However, similar correlations were seen for children living in less affluent areas.[23]

Regulation of HFTs (A5) through SPD and policy

The Town and Country Planning (Use Classes) Order 1987 (as amended) places various uses of land and buildings into 'use classes'; this is in order to control change between one use and another or to control particular uses in specific areas. Shops, including food shops, are class A1 and this covers everything from small independent corner shops and sandwich shops, through to the largest 24-h supermarket outlets. A3 restaurants and cafes also cover a wide range of establishments from an independent vegan wholefood café, to a multinational fast-food chain, as long as a significant provision for on-site consumption is provided. This topic is returned to in the 'Limitations' section.

The Order is amended periodically and a specific 'A5' HFT was introduced in 2005. Control of use classes in specific areas may be part of the planning policy, as part of the Local Plan, or as guidance produced as SPDs which either include issues too detailed to go into the core policy or where rapid response is required to an emerging issue. Policy carries more weight in planning decision-making than guidance, but an issue such as controlling fast-food outlets might require both. The earliest SPD aimed at controlling fast-food proliferation was focused on nuisance and antisocial behaviour associated with HFTs (Waltham Forest); however, in 2010, the London Borough of Barking and Dagenham produced their SPD 'Saturation Point' which gave weight to health impacts and evidenced public health and nutrition research.[24] A recent census of all of England's local government areas (n = 325) found that 164 (50.5%) areas had a policy that focused on takeaway food outlets, while 56 (34.1%) focused on health.[25]

Planning appeals

Planning policies and/or guidance that aim to restrict the opening of new HFTs can be used by local planning officers to reject new planning applications for this use. In doing so, they consider whether their case is robust enough to argue at appeal. Applicants have a right to appeal the local authority decision and do so by lodging an appeal with the National Planning Inspectorate (https://www.gov.uk/government/organisations/planning-inspectorate/about) (PINS); in these cases, they are referred to as the appellant. Many appeals involving HFTs are decided under a process known as 'written representations'; in other words, the inspector will gather all the evidence together in the form of written statements from the appellant, the local planning authority (LPA) and anyone else who has an interest in the appeal. Each party has the opportunity to comment on each other's statements, without making any verbal submissions. However, a hearing or inquiry may also be held. Hearings are relatively informal, essentially a round table discussion led by the inspector, where people can put their case across and respond to the inspector's questions. A hearing is a much more formal process where parties present their case and witnesses are questioned by the inspector and the other parties as to the evidence that they have presented.

Inspectors decide appeals on a case-by-case basis. Procedure is tightly prescribed, so in reaching their decision, they should consider any material submitted to the LPA regarding the case; all the appeal documents; any relevant legislation and policies, including changes to legislation; any new Government policy or guidance; and any new or emerging development plan policies since the LPA's decision was issued; finally, they may include any other matters that they consider material to the appeal. Appeals will either be upheld, in which case the inspector finds in favour of the appellant and overturns the original local authority decision, or dismissed, in which case the inspector finds in favour of the local authority. It should be noted that planning appeals encompass a vast array of matters, for example, environmental issues, highway safety, design and health to name but a few diverse topics. At present, Planning Inspectors are not required to hold any special qualifications and/or receive instruction in relation to any of these specialist subjects, and it might be questioned, therefore, whether there is adequate training. While inspectors will have a vast amount of experience to draw on, given the relatively recent increased emphasis on health, their knowledge of this field in relation to planning may be quite limited.

While we are aware nationally of a number of appeals around HFTs, and the appeals procedure is clearly prescribed,[22] there has been little systematic research in relation to decision-making in this area.

Aims

The aim of this research was to explore the appeals process further by examining influences, including barriers and facilitators to the inspectorate's decision to either uphold or dismiss cases.

Methods

In May 2018, a 1-day seminar was held examining the control of proliferation of A5 uses by the planning system. This included a half-day workshop for planning and public health practitioners, who had either already produced guidance/policy on this topic or were in the process of doing so. Some of the practitioners had experience of HFT appeals which was particularly valuable to the study. Findings from the discussions in this workshop are not presented in this article, but contributed to the design of this study.

Data from the appeals database were analysed using a thematic content analysis approach, building on our discussions with practitioners.[26] This aimed to identify commonalities and differences in the data, prior to focusing on relationships between different parts of the data, thereby seeking to draw descriptive and/or explanatory conclusions clustered around analytical themes. Interpretation of the data into analytical themes allowed for relationships between themes to be identified and proved useful in determining whether or not themes were barriers or facilitators to the National Planning Inspectorate's decision-making processes. Narrative synthesis of evidence generated will be discussed to provide an overview of the appeals process and explore factors that may potentially impact on decisions made.

In June 2018, the database *Appeals Finder* (https://www.gov.uk/appeal-planning-inspectorate) was searched for planning appeals related to obesity, health and fast food. *Appeals Finder* indexes over 160,000 planning appeal decisions from all of England and Wales from 2010 onwards. We searched using the keywords 'A5' AND 'food' AND 'obesity' which generated 62 results. After assessing the titles and brief detail of each result, 52 results were retained for further assessment (Figure 1). All documents linked to the 52 results were saved. Textual information in terms of evidence that may impact on the decision-making processes within each case was obtained from the database and examined for recurring themes using a framework approach.[26]

RESULTS

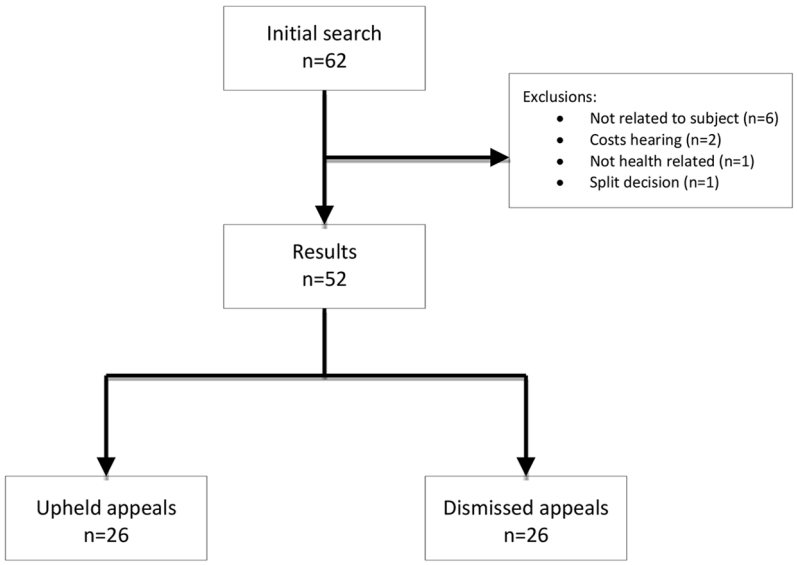
Appeals cases

Of the 52 appeals cases, 26 were upheld (local decision over-turned and Planning Inspector (PI) found in favour of the business) and 26 dismissed (i.e. permission not given to the HFT). Of those that were dismissed, 23 were independent stores and 3 were multinational chain retailers. Similarly, of those that were upheld, 22 related to independent stores and 4 were multinational chain retailers.

Regions with the most appeal cases were London ($n = 17$) and the North East of England ($n = 10$). In London, 35% of cases were dismissed (i.e. permission *not* given to the HFT) as opposed to 60% in the North East. The majority of inspectors (>94%) were male. A total of 23 different named inspectors were responsible for making the 26 upheld decisions with three of those being assigned to two cases and the remainder only one. Similarly, there were 24 different named inspectors who were responsible for the 26 dismissed cases with two being assigned two cases and

Figure 1

Results from *Appeals Finder* database search.



the remainder only one. Six of the inspectors were involved in both upheld and dismissed cases. There were a number of themes identified as having an impact on the appeals decision-making process and many were common to both upheld and dismissed appeals.

Finding 1: appeals upheld (i.e. planning permission granted to HFT)

Non-evidence-based decisions

It is to be expected that the quasi-legal procedure of appeals would be based on evidence, very much as case in law. Overall, however, while PINS would argue that inspectors make difficult decisions based on professional judgement, as outlined below, some decisions at least seemed to be largely based on un-evidenced statements, rather than being supported by any current academic/health evidence and/or policy.

In many appeals upheld, inspectors stated that the 'evidence' provided to them regarding HFTs and health impacts, such as obesity prevalence, was insufficient to guide their decision-making:

> *There is also little substantive evidence before me that would lead me to conclude that the location of the proposal would have a direct correlation with childhood obesity.* (ID 20)

As outlined in the introduction, evidence between fast-food consumption and childhood obesity does exist, but in this case, the evidence presented in the statement from the LPA was not deemed substantive. However, the precise reason that evidence was deemed deficient, in this case and in other similar cases, is generally unclear. For example,

> *Accordingly, I conclude that the principle of the use would be acceptable ... while any conflict with the SPD would not warrant a refusal of the proposal.* (ID 11)

Despite the existence of an SPD, clearly little weight is afforded to it, but again why is unclear.

Another issue was that there appeared to be a disconnect between what inspectors believed to be enforceable, as opposed to what practitioners suggested in the seminar is realistically achievable once an appeal has been upheld and granted. For example, there are instances of upheld appeals with inspectorate recommendations that the HFT establishments should consider opening hours that do not make unhealthy foods easily accessible to children attending local schools. These are clearly to inform planning conditions imposed on the permission; however, the extent to which they are enforceable may be questioned. LPA enforcement is often under severe pressure. Moreover, unlike a structure that is built without planning permission, for example, opening hours are arguably much trickier to monitor:

> *Takeaway permission granted – however conditions applied to opening hours 'The X Collegiate, which educates teenagers of secondary school age, is well within the 400m threshold identified for the purposes of conditioning opening hours to prevent ready attraction of children of secondary school age at lunch-time'.* (ID 50)

Again, while PINS would undoubtedly point to the vast experience and knowledge that inspectors bring to appeals cases, there was evidence of less than ideal practice in some cases. For example, the reasoning and text to support two quite different appeals that were upheld within one region, one day apart, consisted of an identical concluding statement by the inspector. The appropriateness of such 'cut and pasting' when decisions are supposed to be individually considered might be questioned. It could suggest a lack of assessment rigour or point to an under-resourced system under strain where the odd corner is taken by hard-pressed professionals. Whatever the reason, it does call into question the overall integrity of the decision-making process.

Impact on health

A number of decisions relating to cases upheld were made based on the assertion that the impact of HFTs on obesity was minimal and therefore had little impact on health:

> *Very little substantiated or objective evidence has been presented to show conclusively that the presence of the proposed restaurant [large retail chain restaurant] and takeaway would be*

'likely to influence behaviour harmful to health or the promotion of healthy lifestyles'. (ID 56)

Some of these decisions had a somewhat dismissive tone about the association between HFTs and obesity. For example, statements from inspectors indicated that they believed the planning department was not responsible for decisions that would have an impact on health issues such as obesity, which would certainly seem to run counter to the spirit of the NPPF. Others ranked the importance of obesity below other issues that were provided as justifiable reasons for case dismissal, for example, noise, rubbish, car parking:

Although proposals for new takeaway facilities can legitimately be refused on grounds of amenity, car parking, noise and loss of retail facilities, etc., it is acknowledged that questions of obesity and unhealthy living are insufficient on their own to refuse planning permission. (ID 1)

In this case it is unclear whether the inspector's position is based on the evidence presented in the appeal, or whether they believe this to be the case more generally.

Other inspectors stated that the addition of one more takeaway would not be influential enough to have an impact on health in general, inequalities, obesity and the creation of healthier neighbourhoods:

The Council raises a concern about allowing a further hot food takeaway outlet in respect of the health implications relating to obesity levels within the local community. However, I have received insufficient evidence that the addition of this single outlet would be a material exacerbating factor, particularly as there is a wide choice of food retail outlets in the area available to local residents.

Further cases suggested there was no evidence that takeaways encourage unhealthy eating (ID15), two cases that the location of the HFT did not directly correlate or was linked directly to childhood obesity (ID20 and ID54) and a further three cases which stated there was no evidence to suggest a direct link between HFT provision and childhood obesity (ID26, ID45 and ID46). With all of the above issues, there is a wealth of evidence available, but it may not be in a form that is easily translated to individual cases:

The site is located near to several schools and rates of childhood obesity are particularly high in X (location). However, there is no detailed evidence before me to demonstrate a causal link between this issue and the provision of takeaway establishments. (ID 45)

Although it was acknowledged that an unhealthy diet could potentially affect health, this was sometimes outweighed by other factors which were deemed equally or more important such as providing a variety of food options:

The concern is that an unbalanced diet, perhaps combined with insufficient exercise, over-reliant for example on meals with high fat and salt content, will be unhealthy, even dangerous, over a period of time. This consideration needs to be balanced against the desirable ability for individuals, including adults, to have a range and choice of eating options which might include occasional take-away meals, saving them time and causing them no harm. (ID 29)

In this case, one might seriously question what evidence the inspector is basing their decision on. How do they support their assertion that the desirability of having a range of eating options, including takeaways, outweighs the possible harm they may cause? As far as the authors are aware, there is no robust evidence to support this claim.

Parental control

The issue of parental control and responsibility was also cited several times as being an important factor when discussing accessibility of HFTs to children. When assessing the location, distance and ease of access of takeaways to school children and its' impact on health, several inspectors felt that parents should be held wholly responsible. This was particularly true for cases involving younger children attending local primary schools as it was assumed that these children walked to and from school accompanied by their parents. It was also felt that it was the parent's responsibility to influence and steer their child's food choice:

Any potential effect on the health of school children is a material consideration. However, I am mindful that children of primary school age would mostly be accompanied by an adult, who are able to guide food choices. (ID 47)

The assumption of parental responsibility also held true in cases where children were free to leave school premises at lunchtime although there was no evidence given to support this:

Whilst I note the evidence that the primary school does allow children to leave the premises at lunchtimes, I consider that primary school children would usually be accompanied by and be under the supervision and responsibility of parents or carers when travelling to and from school. Therefore, at these times, the primary school children would be under the responsibility of adults and would not have unfettered access to the takeaway. (ID 5)

Again, in these cases, there is no robust evidence to support the assertions made by the inspectors. For example, in the UK, there is no minimum legal age for child to walk to school unaccompanied and younger children may be accompanied by an older sibling (the most at-risk group to HFT exposure) rather than a parent.

Economic argument

Having a blanket ban on HFTs, even within areas that have an obesity prevalence rate higher than 10%, was perceived to be detrimental to the local economy by some planning inspectors.

In some cases, inspectors perceived that HFTs supported other local businesses and provided additional employment opportunities for local people:

> *I find the harm to the emerging policy insufficient to outweigh the requirements of the Framework to support a growing economy and the positive, albeit small, contribution the proposal would make to local job creation.* (ID 31)

Others felt that the positive local economic impact that the proposed HFT would offer prevailed over any detrimental concerns such as excessive proliferation of HFT establishments and financial impact on other businesses:

> *Whilst I acknowledge that there are other fast food retailers in the area and a perceived lack of need for similar uses, the appellant is content that the proposed businesses are viable and this matter does not outweigh the support for the scheme that I have found. Nor does the potential for increased competition with other businesses given that the development would contribute to the local economy.* (ID 37)

Here, once again the evidence that inspectors are using to support the economic case is somewhat unclear. In terms of alcohol sales, for example, some analysis has shown that benefits to the local economy are outweighed by additional cost to local health service provision, but as far as the authors are aware, no such similar cost–benefit analysis has been carried out on HFTs.

Opening hours

The suggestion of HFTs considering time restrictions on opening hours, so they do not fall within school start, finish and break times, was made in four cases. In these cases, inspectors believed that if opening hours were limited, this would solve the problem of children visiting and purchasing unhealthy food from these establishments. They made assumptions that restrictions on opening hours would be easily enforceable and could be applied for various times such as in school holiday and term time:

> *Takeaway permission granted but with restrictions on hours – consider a condition restricting term time opening of the proposal to be necessary to prevent potential harm arising from children's access to unhealthy foods.* (ID 17)

However, as already stated, the practicalities of enforcement at a time when many LPA services are under pressure are unclear.

Disputing facts

Finally, factual evidence which had been included in LPA statements, and therefore should have provided robust grounds for dismissal, was disputed by the PI in a number of cases. For some, this related to the distance that the schools were located from the proposed HFT, concentration of HFT outlets within the local area and the weight, relevance and availability of local policy and/or guidance:

> *My attention has been drawn to the links between takeaway food and poor health generally and child obesity in particular. However, I do not consider such matters would constitute a reason to dismiss the appeal in the absence of definitive Government planning guidance and development plan policies on the issue.* (ID 43)

In another example, information provided by the appellant was considered when making decisions in relation to proximity of the HFT to the local school when assessing health impacts:

> *It has been identified that some pupils of the local school are likely to pass by the site and I note concerns that the development would encourage unhealthy eating habits and contribute to child obesity. However, the school is around 800m from the site according to the appellant and the development would not be located in the immediate environs of the school where pupils would be encouraged to visit on a regular basis. The fact that some pupils may choose to frequent the proposed businesses would not significantly impact on local health.* (ID 37)

Here, what the inspector's decision seems to hinge on the appellant's statement is that 800 m was too far for children to access the HFT. However, Brighton and Hove's impact study 'HFTs near schools' found that pupils regularly travelled farther than 800 m during lunchtimes to visit their favourite hot food outlets and also observed that fast-food purchase was linked to other unhealthy behaviour such as smoking.[27] Therefore, not only is the decision based on an assumption that is un-evidenced, but it is also factually incorrect.

Finding 2: appeals dismissed (i.e. the local decision is maintained, and planning permission for HFT is denied)

Decisions made that resulted in a case being dismissed (i.e. denial of permission to become an HFT) were based on a number of factors. However, these factors were often based on reasons other than health such as impact on neighbours' living conditions, noise pollution and highway safety. The weight given to the Development Plan appeared somewhat unclear with a number of inspectors disregarding policies and/or guidance documents when making decisions.

Disregarding childhood obesity

Some inspectors felt that the issue of pupils accessing HFTs and any link with childhood obesity was simply irrelevant to the case given that, in their opinion, it would only be accessible to a small number of pupils. A disregard of adherence to local policies in relation to health was evident. Some inspectors felt that the issue of population health was not deemed as being sufficient enough to warrant a dismissal:

... while the proposal's proximity to the schools and its effect on healthy eating and the well-being of children are material considerations, I conclude that the number of pupils from these schools that would use the premises during the school day would not be significant. Consequently, in this respect the proposal would not conflict with Policy 13 of the Core Strategy. so not related to obesity or unhealthy eating. (ID2)

Although the proposal might conflict with national policies concerning the promotion of healthy lifestyles and reduction of childhood obesity, this does not justify dismissal of the appeal on these grounds. (ID7)

The reasoning behind these views was unclear.

Economics

Appellants frequently highlighted the economic benefit their business would bring to the local high street by increasing custom for other establishments and providing employment. However, economic reasons, although considered were dismissed by inspectors in favour of what they believed to be more significant issues such as highway restrictions and breach of policy:

However, neither these matters, nor the employment and career opportunities which would be created, outweigh the harm identified. I have considered all other matters raised, but they do not alter my decision. (ID 33)

Drawing these threads together, whilst there would be some economic benefit derived from the proposal this, on its own, is not sufficient to outweigh the conflict with a very recently adopted local plan policy. (ID 9)

Support of local policy and planning

Approximately 40% (n = 10) of cases were dismissed on the basis that the proposed business would violate local policy and planning. Acknowledgement of obesity and health was evident in some (n = 8) cases and this was provided as the primary reason for dismissal:

... The appeal proposal would however lead to a proliferation of takeaways in the local area, which, given their close proximity and easy walking distance to these schools, would be likely to attract custom from children and undermine the Council's efforts in creating and developing healthy communities. (ID 36)

However, the significance of obesity given to cases was variable and it was clearly stated in others that obesity was not an adequate enough reason:

Takeaway permission denied – however 'The effects of takeaway food on child obesity would not constitute a reason to dismiss the appeal'. (ID 49)

In some cases, childhood obesity was cited as 'adding weight' to the dismissal and not a prioritising or deciding factor:

The objective of the SPD, to establish healthy eating habits and reduce childhood obesity, is an important one and whilst not a main issue, the proposal's failure to comply with it adds weight to my decision. (ID 8)

Inspectors also recognised that, although appellants claimed that they would make adjustments to their business, for example, making pledges to create a healthier menu that there would be no way of enforcing and/or monitoring this:

The appellant states that it is his intention to offer a healthy alternative to the existing takeaways in the area. However, I agree with the Council that this is not a factor that can be controlled. I therefore conclude that the proposed change of use would undermine the Council's objectives to improve community health. (ID 38)

DISCUSSION

In a number of cases presented, it is clear that the NPPF and local policy guidance were influential in the inspectors' decision-making and indeed, in some cases, a determining factor.

Yet, the over-riding finding was that inspectors considered that they had insufficient evidence concerning HFTs and health impacts to base their decision-making on, though why the evidence was found wanting was generally unclear. It is worth considering the issue of evidence from the inspector's perspective. Although the *kind* of evidence presented at each appeal follows a similar pattern, its quality and quantity may vary considerably from case to case. Inspectors place a great deal of weight on robust evidence at local level; the availability of any such evidence to an individual local authority varies considerably. Generally, for example, much health evidence is produced at the national level and its applicability to specific cases limited. Therefore, a clearer framework for interpreting macro-national level data at the micro-local level would be highly desirable.

While it is appreciated that inspectors have an extremely difficult job balancing a vast array of issues in appeal cases, the general lack of engagement with health issues in decision-making was concerning. However, this does mirror previous work exploring planners and public health practitioners' views on addressing obesity.[28] This research identified a range of barriers that prevent planners from engaging with obesity prevention. These include having an insufficient understanding of the causes of obesity and the importance of addressing obesity through multiagency approaches. It was concluded that planners could and should be better engaged in the obesity prevention agenda;[28] this necessitates proper resourcing, and in many LPAs, services have faced severe cutbacks and are struggling to meet even statutory requirements.

One key issue that inspectors could easily be aware of is that evidence suggests individuals do not always make or are not always *able* to make informed healthy food choices and that those who

reside within the vicinity of a significant number of HFTs are more likely to consume them on a frequent basis than those who do not.[12] For reasons that are not entirely understood, poorer, less educated individuals are more susceptible to consume to excessive levels, which in turn may exacerbate health inequalities.[12,29] It would also be helpful if inspectors were aware of the lengths that some individuals, particularly older children will do to access HFTs. Moreover, there is no evidence that greater choice of HFTs is in any way beneficial to local communities. The less establishments there are will help control access and, in turn, the potential detrimental effects on health. It might be suggested that such key points could be covered in a relatively concise briefing note, for example.

There is also an issue of transparency in decision-making. No doubt, the inspectors would argue that all decisions were based on professional opinion, drawing on the evidence presented, and making a judgement on the weight to give each aspect of the case. However, in trying to undertake a dispassionate review based on the paperwork alone, it was often quite difficult to understand the inspector's reasoning. For example, in some cases, completely un-evidenced (and even factually incorrect) statements made by appellants were given credence. While in other cases LPA guidance and policy, which would have at least undergone scrutiny in its preparation, was dismissed as unimportant. This is clearly an issue which is beyond the immediate topic of A5 use and runs to the heart of appeal decision-making. However, decisions in A5 appeal have the potential to adversely impact the health and wellbeing of individuals and communities. This would not be the case with every type of planning appeal. It could be argued that, in such cases, only those matters that have robust evidence to support them should be taken into account in reaching a decision to uphold or dismiss an appeal. The onus, therefore, on all parties, should be to provide compelling evidence to support their case. It would also be useful to local authorities in particular to receive more direction in cases where their evidence base falls short, to assist them in preparing cases in the future.

The issue of planning conditions and opening hours is another topic that addresses matters beyond A5 use, given that other types of establishment may have open hours imposed on them. We have no evidence that planning conditions to control A5 premises are ineffectual. We are also unaware of any research on this topic. However, there is clearly a concern among planning practitioners that controlling opening hours through enforcement is not necessarily a straightforward task. One practitioner also pointed out that small independent HFTs often change hands on a regular basis and that enforcement officers may well find themselves constantly playing catch-up as to who they were taking enforcement action against.

That childhood obesity in particular is a topic of extraordinary importance can surely not be questioned. The damage to young developing bodies can be significant and it is proven that health problems can track through into later life, even if individuals subsequently lose weight.[30] Childhood obesity is a societal problem and it is everyone's responsibility to do their part to address it.[31] Planning is no exception and that planning has a role to play in obesity prevention is long established.[4] However, it must be acknowledged that this is a relatively new role for planning and it is a challenging one.[28] Elements that are coming in to play, such as the use-classes system, were devised in very different times, shaped by different sets of dynamics. If the challenge of delivering healthy communities is promoted by the NPPF, some aspects of the planning system could require major overhaul, but these changes may take considerable time. Meanwhile, it is beholden on all involved to try and make the best of the current situation, and within this we include academia, especially in provision of an appropriate and timely evidence base. In local authorities, it is suggested that programmes such as the National Health Service (NHS) Healthy New Towns approaches[32] be used to provide insight in helping to identify policy drivers which could strengthen existing planning policies. A Health in All Policies approach as advocated by World Health Organization (WHO) and the UK Local Government Association should be adopted to ensure that all decisions made consider all relevant health implications.[33,34] In addition, this will encourage an all-encompassing move within planning and health from a silo to a system-wide approach.

In terms of appeals, local authorities with the most robust, locally informed evidence bases have the greatest chance of success in having their decisions upheld. In England, local authorities are more likely to have planning policies around health and HFTs if they have a high number of HFTs and higher rates of childhood obesity.[35]

This is a rapidly evolving field of health/built environment evidence. All planners accredited by the Royal Town Planning Institute (RTPI) must complete 50 h of Continuing Professional Development (CPD) during a 2-year period. Reviewing a 4-month period of RTPI-promoted CPD (May–October 2019) revealed that among the many and varied events, only one addressed health issues;[36] though it should be pointed out that the campaigning organisation Town and Country Planning Association (TCPA) has been far more proactive in this regard.[37] In addition, there are local authorities who have shown that using policy guidance in support of cases is resulting in positive outcomes. For example, in Gateshead (North East of England), a recent (March 2020) appeal for a multinational fast-food outlet was dismissed based on the local SPD restriction of HFTs, with inspectorate highlighting the potential impact of such establishments in areas that already have high levels of obesity. It is important to note that there is strong proactive involvement of researchers in this region which may also be a contributing factor in addressing the issue. In adopting such approaches and learning from good practice and collaborative efforts of local authorities, the ability to harness evidence effectively in appeals decision-making can be achieved.

LIMITATIONS

There are a number of limitations relating to this research which must be considered. First, information obtained from the database *Appeals Finder* was collected from 2010 and therefore additional and potentially relevant data which may have arisen in cases prior to this will not have been captured. Similarly, only information entered into the database *Appeals Finder* was considered, yet there is a chance that data could have been omitted for various unknown reasons.

Although various attempts were made by the authors to speak to PINS, this proved to be unsuccessful. In order to provide context and added depth to the data derived from the appeals finder, it would have been preferable to discuss individual cases with PINS. This would have resulted in a better understanding of decisions and highlighted any possible barriers and/or facilitators that they may have encountered. This is one of the key limitations of this research and it is suggested that future work includes working closely with local authorities and, in particular, PINS to understand this process.

Finally, an issue that was brought to the attention of the research team by planning practitioners is the blurring between use-class orders, which may undermine policy attempts to control unhealthy food access. For example, many of the large multinational fast-food chains operate premises as A3 restaurants and cafes, by providing seating areas, even when from a business point of view these are largely unwarranted. Planning processes seek to root our 'back door' A5 applications, but the distinction is not always clear. Similarly, A1 convenience stores, bakers and so on may sell a small selection of hot takeaway food products, again blurring the A1/A5 boundary. These are significant challenges and will be addressed in future work.

CONCLUSION

The importance of health and, in particular, the threat of obesity and associated complications needs to be included and made mandatory within all planning and policy documentation. All material considerations need to be taken into account and assessed on a case-by-case basis, while remaining mindful of the consequences on population health. Decisions need to be evidence based and official government planning policy and guidance are easily accessible and available to help steer judgements on any decisions that may impact health. Importantly, consideration of all evidence needs to be weighed up collectively rather than being based on mere assumptions or opinion, and health in all policies should be consistently encouraged and prioritised.

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This research did not require ethical approval as the data analysed were obtained from the appeals database finder which is freely accessible information: http://www.gov.uk/appeal-planning-inspectorate

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All authors contributed equally to this work.

CONFLICT OF INTEREST

The author(s) declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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Viewpoint

Social Media for Public Health: Framework for Social Media–Based Public Health Campaigns

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Abstract

The pervasiveness of social media is irrefutable, with 72% of adults reporting using at least one social media platform and an average daily usage of 2 hours. Social media has been shown to influence health-related behaviors, and it offers a powerful tool through which we can rapidly reach large segments of the population with tailored health messaging. However, despite increasing interest in using social media for dissemination of public health messaging and research exploring the dangers of misinformation on social media, the specifics of how public health practitioners can effectively use social media for health promotion are not well described. In this viewpoint, we propose a novel framework with the following 5 key principles to guide the use of social media for public health campaigns: (1) tailoring messages and targeting them to specific populations—this may include targeting messages to specific populations based on age, sex, or language spoken; interests; or geotargeting messages at state, city, or zip code level; (2) including members of the target population in message development—messages should be designed with and approved by members of the community they are designed to reach, to ensure cultural sensitivity and trust-building; (3) identifying and addressing misinformation—public health practitioners can directly address misinformation through myth-busting messages, in which false claims are highlighted and explained and accurate information reiterated; (4) leveraging information sharing—when designing messages for social media, it is crucial to consider their "shareability," and consider partnering with social media influencers who are trusted messengers among their online followers; and (5) evaluating impact by measuring real-world outcomes, for example measuring foot traffic data. Leveraging social media to deliver public health campaigns enables us to capitalize on sophisticated for-profit advertising techniques to disseminate tailored messaging directly to communities that need it most, with a precision far beyond the reaches of conventional mass media. We call for the Centers for Disease Control and Prevention as well as state and local public health agencies to continue to optimize and rigorously evaluate the use of social media for health promotion.

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KEYWORDS

social media; digital heath; health communication; campaign; public health; framework; health promotion; public awareness; misinformation; tailored message; tailored messaging; information sharing; information exchange; advertise; advertising

Introduction

The pervasiveness of social media is irrefutable; 72% of adults and 84% of adults aged 18-29 years report use of at least one type of social media platform and an average daily usage of 2 hours [1,2]. Social media has been shown to influence public opinion, political views, and purchasing behaviors, as well as health-related behaviors such as diet and exercise [3-6]. This offers a powerful tool through which we can rapidly reach large segments of the population with tailored health messaging. It has also become a potent arena for widespread dissemination of misinformation and disinformation, posing its own public

health threat [7-9]. However, although numerous studies have explored the dangers of misinformation and have used data from social media to interpret public attitudes [10], the specifics of how public health practitioners can effectively use social media for health promotion are not described. In this viewpoint, we propose a new framework with the following 5 key principles to guide the use of social media for public health campaigns: (1) tailoring messages and targeting them to specific populations; (2) including members of the target population in message development; (3) identifying and addressing misinformation; (4) leveraging information sharing; and (5) evaluating impact by measuring real-world outcomes.

Tailoring Messages and Targeting Them to Specific Populations

In addition to connecting individuals, social media platforms, including Facebook, Instagram, Twitter, and TikTok, have sophisticated advertising platforms that facilitate targeting of advertisements to specified populations with far greater precision than conventional mass media. For example, a multivitamin company can send advertisements to women aged 25-40 years living in Manhattan with a household income in the top 10% in the United States and an interest in organic food. Researchers have used these targeted advertising tools for the purpose of study recruitment [11]. For example, Reiter et al [12] used Facebook's targeted advertising to recruit young gay and bisexual men for a human papillomavirus vaccination intervention by selecting for English-speaking males in the United States aged 18-25 years with any of the following "interest" filters: bisexuality; homosexuality; same-sex relationship; genderqueer; gay pride; lesbian, gay, bisexual, and transgender (LGBT) community; LGBT culture; or rainbow (LGBT movement) [12]. Public health practitioners can leverage ad targeting to send tailored health messages to specific populations based on age, sex, or language spoken; interests, such as "smoking," "aerobic exercise," or "McDonalds"; or geotarget messages at state, city, or zip code level. Targeting messages by language spoken is particularly relevant to immigrant and refugee communities, for whom language barriers may limit understanding of alternative sources of health information; for example, in Germany, social media advertisements in migrants' languages of origin increased COVID-19 vaccine appointment bookings by 133% for Arabic speakers and 76% for Russian speakers [13]. Of note, Facebook continually reviews the available ad targeting options and ad controls with the aim of reducing the possibility of ad discrimination; for example, in January 2022 they removed previously available detailed targeting options that "relate to topics people may perceive as sensitive," which include health causes such as "lung cancer awareness" and "chemotherapy" [14]. We therefore recommend frequent monitoring of targeting options when planning campaign implementation to ascertain what will be available for use.

A key challenge in using social media for public health is that algorithms are designed to present advertisements a person is likely to agree or engage with [15], but in public health, we often seek to reach those who disagree, for example, convincing a smoker to quit or a reluctant parent to vaccinate their child. One way to address this is to tailor messages and separate them into narrower ad sets for specific populations. For instance, although COVID-19 vaccine promotion messages might be unpopular among vaccine-hesitant groups, we can increase message salience by tailoring them to subsets of the target population—a message debunking fertility concerns could be sent to women aged 25-30 years with an interest in "motherhood"; a video by a Spanish-speaking doctor could be delivered to Spanish-speaking adults in a zip code area with low vaccination rates; and a video by a Methodist priest could be sent to people interested in the "Methodist church" [16]. The ability to rapidly pilot-test multiple iterations can identify the most engaging messages for each group. By structuring campaigns into ad sets, we can also allocate more budget to populations who need it most; for example, using indices such as the California Health Place Index, we can preferentially allocate funds to lower health index zip code areas. An et al [11] propose a useful precision public health campaign framework to guide the use of targeted advertising tools on social media to deliver tailored health messages to particular population segments.

Including Members of the Target Population in Message Development

Engaging community partners when designing public health messaging is paramount in building trust and ensuring effectiveness. Messages should be designed with and approved by members of the community they are designed to reach, to ensure cultural sensitivity and trust-building. One way to achieve this is to assemble an advisory board, including members of the target population, and reflecting the demographics of users of the intended platform. For example, approximately 43% of TikTok's audience is 18-24 years of age, and only 3% is aged >55 years [17]; thus, input from younger, Gen Z voices would be crucial for a campaign running on TikTok. Further, any ad targeting strategies should be transparent and sensitive to the potential for discriminatory ad targeting. Indeed, journalists have demonstrated, with historical ad targeting options available on Facebook, how easy it would be to exclude users whom Facebook classifies as a member of a racial or ethnic minority group from target audiences [18]. Although race categories have subsequently been removed from explicit targeting options on Facebook, the ability to direct ads to specific racial groups is still implicitly possible (to varying degrees of accuracy) via proxies such as zip code targeting. Therefore, we call for discussion with and approval by an advisory board of any proposed ad targeting strategies, alongside a clearly documented rationale that aims to benefit the target audience, prior to campaign implementation. When translating messages, using input from native speakers to ensure optimal language choice rather than relying on automated translations is crucial.

Identifying and Addressing Misinformation

Misinformation on social media has been shown to influence health attitudes; in a randomized controlled trial assessing the effect of web-based misinformation on COVID-19 vaccine

intentions, recent exposure to misinformation decreased vaccine intent by 6.4% among participants who previously stated they would definitely accept a vaccine [19]. The extent to which social media facilitates dissemination of misinformation was exemplified by infodemics—defined by the World Health Organization as an overabundance of both inaccurate and accurate information—during the COVID-19 pandemic [20,21]. Vosoughi et al [8] hypothesize that false news reaches more people than the truth does because it has a higher degree of novelty and provokes stronger emotional reactions of recipients, making it more likely to be passed on. Public health practitioners can directly address misinformation through myth-busting messages, in which false claims are highlighted and explained and accurate information reiterated. This should be an iterative process, beginning with message design and continuing through active comment moderation, including direct responses to false comments during a live campaign. In a randomized controlled trial of messages debunking highly prevalent health information in Sierra Leone, direct and detailed debunking was most effective [22]. Live interactions are a key part of how information is disseminated on social media, yet traditional mass media communication models do not account for this interactivity. Parackal et al [23] propose the dynamic transactional model of communication as a suitable framework for modelling the "two-way communication" in which both the sender and the receiver actively participate in the communication process that takes place on social media [23].

Leveraging Information Sharing by the Target Population

Trusted messengers, including healthcare providers, religious leaders, and celebrities, can play an important role in public health messaging; for example, basketball player Magic Johnson's announcement of his HIV-positive status in 1991 was correlated with increased condom use among Black and Hispanic individuals [24]. Yet social media differs from traditional broadcast media in the rapidity at which messages disseminated from an original source can be publicly reshared by the target population. In a survey experiment on Facebook of 1489 adults, 51% reported that a health article on diabetes was well reported and trustworthy when it was shared by a public figure they trusted, whereas only 34% thought the same article was trustworthy when it was shared by someone they did not trust [25]. When designing messages for social media, it is crucial to consider their "shareability"—can the message be designed in a way that encourages users to share it with their friends? Partnering with social media influencers—users of social media with established credibility among their followers—is a useful approach for leveraging trusted messengers.

Evaluating Impact by Measuring Real-world Outcomes

Evaluation of social media–based public health campaigns should include measurement of the health-related behavior of interest in the target population. Breza et al [26] provide an excellent example, as follows: in a cluster randomized controlled trial, investigators used distance travelled in treatment regions, measured using mobile phone location data of Facebook users, as well as COVID-19 infections recorded at the zip code level, as the outcome measures to assess the impact of a social media advertising campaign asking participants to avoid holiday travel to reduce COVID-19 infections. In our own work, we have piloted an approach using analysis of foot traffic data to tanning salons as an outcome measure to assess the impact of a social media campaign aiming to reduce indoor tanning. Social media platforms also record web-based evaluation metrics, including number of people reached, average duration of videos viewed, reactions, shares, unique link clicks, and cost per individual reached. How these web-based metrics map onto real-world behaviors is unclear; reporting of web-based outcome measures alongside real-world measures can improve our understanding of how these metrics correlate with health-related behavioral change.

Conclusions

Leveraging social media to deliver public health campaigns enables us to capitalize on sophisticated for-profit advertising techniques to disseminate tailored messaging directly to communities that need it most, with a precision far beyond the reaches of conventional mass media. We do not present social media as a public health panacea; grave concerns about cyberbullying, privacy breaches, and misinformation on social media must be addressed in parallel [27]. Further, collaboration between public health scientists and technology companies will be vital to support widespread and potentially expensive ad campaigns, with the success of such partnerships highlighted by extensive COVID-19 vaccine promotion efforts supported by Facebook ad credits [16]. However, in a nation in which three-quarters of adults use social media, for some of whom social media will be the only source of health information, the Centers for Disease Control and Prevention as well as state and local public health agencies must optimize and rigorously evaluate its use for health promotion.

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Authors' Contributions

IDVH wrote the original draft of this viewpoint, under the supervision of EL. Both authors contributed equally to multiple rounds of redrafting and edits.

Conflicts of Interest

None declared.

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Abbreviations

LGBT: lesbian, gay, bisexual, and transgender

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Exploring the Nexus of Healthcare Employees' Professional Quality, Health Psychology and Service Value: A Qualitative Study

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Abstract: While the implementation of the "graded diagnosis and treatment" system highlights the important role of general practitioners as "residents' health gatekeepers", it brings the problem of insufficient service capacity and difficulty in realizing the service value. At present, the service value of general practitioners is a relatively new topic in the field of general medicine. Therefore, few studies discuss the specific path that affects the realization of their service value. According to literature analysis, the professional quality of general practitioners plays a positive role in improving their service quality. So it can be inferred that the main reason for this phenomenon is that the professional quality level of general practitioners as the service subject is low and they have not been trusted and recognized by the residents of the service object. So far, it is difficult for most residents to change their willingness to go to large hospitals. Training is the most critical link to improving the professional quality of general practitioners. Therefore, how to enhance the professional quality of general practitioners through effective training so as to realize the service value is a problem worth discussing. Our study took 37 general practitioners from 12 Community Health Service hospitals as the interviewees and used grounded theory to mine the internal correlation between variables. The results show that: (1) the professional quality of general practitioners mainly includes three dimensions: professional ethics, theoretical knowledge, and professional skills; (2) through training, the professional quality of general practitioners has been effectively improved; (3) the improvement of general practitioners' professional quality directly affects the realization of their technical value, environmental value and information value; (4) the professional quality of general practitioners can be improved through training, which will affect the realization of their service value. Our research contribution is to break through the previous research paradigm of analyzing the relationship between variables based on the existing literature. This paper uses the procedural grounded theory method to analyze the concept of general practitioners' professional quality from scratch through continuous refinement and summary and constructs a theoretical model of the training path from general practitioners' professional quality to service value. On the one hand, the research results can realize their service value by improving the professional quality of general practitioners. On the other hand, the realization of the service value of general practitioners can provide effective support for patients to create a good medical environment.

Keywords: healthcare employees; health psychology; professional quality; service value; grounded theory

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1. Introduction

As the "residents' health gatekeepers", general practitioners act as the first filter of the whole social–medical security system. Driven by this goal, the realization of the service value of general practitioners undertakes the front-end filtering function of the whole social–medical security system and is affected by the interaction of the serviceability of the back-end medical system. Therefore, the level of general practitioners' serviceability in

this situation determines whether they can shoulder this important task. At present, the implementation of policies such as "graded diagnosis and treatment" and "serious illness in hospital, minor illness in community" is difficult to promote, which reflects that the medical work of the general practitioner who is the "gatekeeper" of residents' health has not been recognized and paid attention to by the residents. Therefore, there is a strong contrast between the reality and the expected service value. The main reason for this result is the low professional quality of general practitioners, which affects the promotion of service value and the implementation of policies. Specifically, the professional ethics, theoretical knowledge reserve, and professional skills of general practitioners are relatively low. Because the nature of the work of general practitioners is to switch back and forth between multiple identities, the professional ethics of doctors, such as being indifferent to fame and fortune, inner peace, and treating patients with a sincere attitude and good communication, are affected. Busy work will not allow general practitioners too much time to accumulate basic professional knowledge and other relevant knowledge. The development of professional skills, such as door-to-door service, is relatively slow. These phenomena reflect that the professional quality of general practitioners is at a relatively low level, which limits the realization of their service value, resulting in some difficulties in the implementation of the policy of "serious illness into the hospital and minor illness into the community". Based on practical problems, the Chinese government has proposed a series of policies to improve the professional quality of general practitioners in community hospitals. In 2017, the National Development and Reform Commission's "Thirteenth Five-Year Plan" National Health and Family Planning Professional Technical Personnel Training Program proposed the use of training resources in various ways to increase continuing medical education and training; in 2018, in the "opinions on reforming and improving the incentive mechanism for the training and use of general practitioners", the Chinese government called for a reasonable allocation and expansion of the enrollment quota of standardized training for professional residents. It can be seen from the policy that training is not only aimed at continuing education for in-service general practitioners, but also has increased the amount of standardized training. Some scholars have also pointed out that gaining the trust of residents improves the basic knowledge and clinical competence of grassroots doctors [1–3]. Most of the literature indicates that training can improve the professional quality of general practitioners. Training programs are of great help to general practitioners' consultation skills (reception, medical history collection, and medical record records); at the same time, they can increase the accumulation of theoretical knowledge [4]. More and more general practitioners find that relevant professional ethics should be added to the training, which is convenient for establishing effective communication with patients [5]. It can be seen that training is an important way to improve the professional quality of general practitioners, but the effectiveness test of the training results, that is, what service value it will bring, is not clear at present.

Professional quality refers to workers' understanding and knowledge of occupation through social practice activities [6], and finally forms the qualities they need in the work. Generally, professional quality refers to comprehensive qualities such as knowledge, professional skills, and professional ethics. According to China's current national conditions, the State Council of China puts forward the definition of general practitioners in the "Guiding Opinions" as: general practitioners are medical professionals with a high degree of comprehensiveness. They are mainly responsible for prevention and health care, diagnosis and treatment of common and frequently occurring diseases, referral, patient rehabilitation, chronic disease management, health management, and other integrated services at the grassroots level and are known as "residents' health gatekeepers". Through the understanding of professional quality and the definition of general practitioners, this research believes that the professional quality of general practitioners is the comprehensive quality of professional skills and professional ethics formed by general practitioners through their understanding of the integrated services of prevention and health care and health management [7–10].

Professional quality is generally used in education fields such as teachers and students. In most fields, competence is used as the standard to measure ability and quality. Competence is relatively widely used in enterprises, and scholars mainly divide its dimensions from the perspectives of knowledge, skills, communication, and professional ethics [11,12]. In the field of general medicine, most studies use general practitioners' competence as the main measurement form. They mainly include the competency model of primary health care, community disease management, the ability to solve specific problems, and overall analysis [13,14]. At present, there are not many descriptions of the professional quality of general practitioners. Some scholars analyze the dimensions of professional quality from the perspective of clinical pharmacists, which mainly include professional ethics, professional skills, and professional behavior [15]. According to the available literature, how to improve the professional quality of general practitioners through training is the main concern of scholars [16–18]. At present, general practitioner training mainly includes three forms: standardized training, transfer training, and continuing education. The target population of standardized training is medical students, and the training focuses on basic theories, clinical skills, and primary medical and health practices [19,20]. In recent years, some scholars have proposed that humanistic quality should be added to the training, mainly starting from the physical and mental health of patients and paying attention to the correlation between humanistic emotion and management ability and the factors of patients' physiological attributes [21–23]. Some trainees reported that the level of professional knowledge and skills, teamwork, and learning ability has improved, and community health service capabilities have been improved [24,25]. The transfer training is aimed at qualified basic-level on-the-job vocational physicians or vocational assistant physicians. The content of the transfer training is also carried out around the professional quality of general practitioners. It mainly includes training in knowledge and skills, and the emphasis on mental health and communication skills has also increased [26,27]. After training, appropriate adjustments should be made according to the service effect. For example, in the face of the application of general medicine and the unsatisfactory mastery of knowledge and skills in the field of preventive medicine. The main reason for this phenomenon is that the types of transfer trainees are complex, so it is necessary to carry out targeted training for trainees at different levels [28,29]. Continuing education is mainly for on-the-job general practitioners. The training contents mainly include clinical medical knowledge and skills, rational drug use, and disease diagnosis and treatment. The training has played a positive role in improving the comprehensive professional level [30–32]. The three forms of training face different groups of people, reflecting the breadth and comprehensiveness of the training. The content of the training is mainly carried out around the professional quality of general practitioners. After the training, it produces certain effects, such as knowledge and skills. All skills have improved, and service capabilities have also been improved [33–35]. Service value is reflected by the value perception of the demander and the value obtained by the supplier by satisfying the demander. There are many factors that affect the value of services, among which the quality of service and the service perception atmosphere on the demand side are two important aspects. For example, Sadeh et al. found through empirical research that the level of customer perceived service value is related to the quality of service provided by the enterprise [36]. Mokhtaran et al. assessed the impact of employees' perceived service atmosphere and customers' perceived service value [37]. Through the research on the service value measurement dimension, it is found that scholars gradually extend the technical value, functional value, cognitive value, and other dimensions from the perceived value of customers in the enterprise. In the field of general medicine, there is relatively little research on service value. For example, Wang constructed a community health service value evaluation model, which is divided into environmental value, information value, and technical value [38].

According to the above analysis, we can find that scholars have achieved some results in the research on the dimensional division of general practitioners' professional quality and the relationship between professional quality and training, but there is a lack of

relevant research on training to service value. At present, the research on service value dimensions and influencing factors is relatively rich, which can provide corresponding clues for the research on the relationship between training and service value. It can be seen from its influencing factors that although general practitioner training rarely directly affects service value, the above-mentioned service quality and service perception atmosphere of the demander are related to general practitioner training. The purpose of training is basically to improve the service quality of general practitioners so as to create a good service perception atmosphere for patients and ultimately realize their service value. Based on the above findings, there are few studies on the service value of general practitioners, and it is difficult to infer the specific process of its realization from the existing literature. Therefore, our study breaks through the research paradigm of deducing the relationship between professional quality, training, and service value based on the existing literature. The grounded theory method is to take the experience and thoughts described by the interviewees as the original data. Through the level-by-level coding of data, a higher-level category is extracted. It is a process of mining and discovering the internal relationship between the three from complex phenomena so as to build a theoretical model more in line with the actual development needs. Firstly, this paper introduces the grounded theory research method, research design, and theoretical sampling. Secondly, according to the research paradigm of procedural grounded theory, we conducted open coding, axial coding, and selective coding, and finally obtained the theoretical model of the training path from the professional quality of general practitioners to their service value by continuously extracting higher-level categories. Finally, the theoretical saturation test is carried out, and the coding results are analyzed in depth.

2. Methods

2.1. Grounded Theory

Grounded theory was jointly proposed by American sociologists Glaser and Strauss in the book the "Discovery of Grounded Theory: Strategies for Qualitative Research" [39]. The grounded theory mainly includes the classical grounded theory, the procedural grounded theory, and the Constructivist's Approach to Grounded Theory. We chose the procedural grounded theory. Firstly, the advantage of grounded theory is to mine new theories from reality rather than verifying existing theories in the literature. Among them, the characteristic of procedural grounded theory is a way to establish theory from bottom to top, that is, to find the aggregation points from scattered data to form the core category and then connect the core categories into clues through data analysis and comparison, so as to finally form the overall model [40]. Compared with other research methods, although the subjectivity of the grounded theory method is slightly obvious, the preliminary research of hypothesis theory is very valuable. The procedural grounded theory research method emphasizes that the reasoning of the theoretical model presents a process of clear logic and complete structure. The specific steps are open coding, axial coding, and selective coding. These three levels of coding do not exist in isolation but complement each other. The strength of their internal logical association is an increasing trend. The previous level of coding is to lay the foundation for the next level of coding. At the same time, the coder needs to collect and compare data at different stages until it reaches theoretical saturation.

2.2. Research Design

This study uses the grounded theory method to construct a theoretical model of the training path from professional quality to service value of general practitioners. Raw data is mainly collected in the form of semi-structured interviews. The focus of this research is: (1) Refining the dimensions of general practitioners' professional ethics. (2) Discuss the relationship between professional quality and training of general practitioners. (3) The service value mechanism of the professional quality of general practitioners through training. The initial interview outline consists of 6 questions: (1) What are your job content and responsibilities? (2) What professional qualities do you think are required

to complete the above-mentioned work content? (3) In your work experience, what occupational confusions exist? Can you share 1–2 impressive career development experiences with us? (It can be successful, or it can be confused or low-pitched) (4) Which trainings have you participated in? What are the main methods and contents of these trainings? (5) After completing the training, how do you feel about the training process and effects? (You can express your personal feelings by sharing 1–2 training experiences) (6) Since you took office, what do you think the residents in the area have about general medical care? What is the patient's perception of the unit's general medical service? If there is a change, is it related to general practitioner training? Why? In the interview, according to the interviewee's statement and the in-depth analysis of different levels of the problem, no other new problems appeared, indicating that the analysis of the problem has basically reached a relatively saturated state.

In order to realize the specific mechanism of the training path model from the professional quality of general practitioners to service value, the interview questions raised in this paper correspond to the conclusions. Firstly, how to obtain the professional quality of general practitioners? Secondly, what professional qualities are included in the training? Finally, what aspects of professional quality have been improved after the training, so as to realize what service values? Questions 1, 2, and 3 aim to obtain the conceptual model of the professional quality of general practitioners; Question 4 is about the content and form of training; Questions 5 and 6 aim to reflect that the professional quality of general practitioners has been improved to varying degrees after training, thus affecting the realization of service value.

2.3. Theoretical Sampling

These interviews were mainly in a face-to-face format between June to November 2021. The communication time between the interviewer and each interviewee was generally controlled within one hour, and the interview content was recorded through voice and notes with their consent. The interviewees are mainly represented by 8 community hospitals in Zhenjiang City, Jiangsu Province, including: Qilidian Community Health Service Center, Jingkou District Health Road Community Health Service Center, Jiangsu University Hospital, Huashan Bay Community Health Service Station, Baota Road Community Health Service Center, Runzhou District Sanmaogong Community Health Service Station, Baota Road Community Health Service Center, Liming Community Health Service center. In addition, it also includes 4 health service centers in other regions: Dongfeng Town Health Center, Liaoheyuan Town Central Hospital in Jilin Province, Shanghai Xuhui Longhua Street Community Health Service Center, Suzhou Gusu District Shuangta Street Zhonglou community health service station. There are 37 general practitioners in 12 hospitals. Take 24 bits from it (numbered 1–6, 8, 10–13, 16, 18, 22–24, 26, 28, 31–36) are used for model construction, and the remaining 13 bits (numbered 7, 9, 14, 15, 17, 19–21, 25, 27, 29, 30, 37) are used for model checking. The coding team set up in this paper includes two doctors and two masters. First, the interview recording is converted into editable text as the original data of coding. In order to reflect the interviewer's real thoughts and states, we did not change the expression of the original sentence. Secondly, according to the research paradigm of procedural grounded theory, the original data are encoded in three levels—see below for details. During the whole coding process, we invited two senior theorists to answer all kinds of questions encountered in the coding process to ensure the validity and scientificity of the coding results.

3. Results

3.1. Open Coding

The purpose of this research is to build a training path model from professional quality to service value for general practitioners. In order to highlight the research question, it is necessary to delete the contents of the interviewee's answer that are not related to this research. The initial open coding was carried out by integrating relevant data

information. In the coding process, we randomly selected part of 37 respondents as the original data. Part of the data needs to be retained for the final theoretical model saturation test; therefore, we used 24 of the 37 general practitioners for modeling and the remaining 13 for theoretical model testing. In order to reflect the scientificity of coding, this study used Nvivo 10 qualitative analysis software to conduct a preliminary coding analysis of the text. During the first data processing, the statements related to this article are called free nodes. In total, 163 free nodes were obtained after excluding sentences irrelevant to this study. Through manual coding, we put forward keywords in 163 free points, classified and refined them in the way of clustering, and finally formed 18 clusters. In order to express the category of each cluster more clearly, we extracted a higher-level concept from each cluster. As shown in Table 1, after comparing and analyzing the contents of open coding, 18 frequent categories are obtained.

Among them, (1) "doctors themselves" in the main category of Table 1 mainly refers to the fact that in the face of lower salaries and fewer promotion opportunities, the quality of general practitioners indifferent to fame and wealth determines whether they can contribute to their work; doctor–patient conflict is inevitable. Keeping an inner peace attitude is not only an important way to alleviate this problem but is also a test of the inner tolerance of general practitioners; when faced with difficulties, clear goals and firm beliefs are an important manifestation of the excellent personal qualities of doctors. (2) The most fundamental aspect of "treating patients" in this study is to have a true and sincere attitude; communication is an important way for general practitioners to understand the health of patients and accurately analyze problems; most patients in community health hospitals are elderly people—the patience and encouragement of doctors are the driving force for patients to recover; when patients are in a disease state, emotions will inevitably fluctuate. As a general practitioner, you need to be sympathetic to the patient's pain and understand empathy.

Table 1. Open coding category.

No	Main Category	Concept
1	Door-to-door service	Generally speaking, the interviewees said: Door-to-door service should have three aspects of skills and qualities: First, health management skills, including basic medical service capabilities such as blood pressure measurement, blood sugar measurement, and dressing change. The second is the rehabilitation training skills, the functional guidance to help disabled elderly, and the management of the condition of long-term bedridden patients. The third is disease prevention skills. Through long-term observation of the patient's physical state and emotional changes, once an abnormal situation is found, the ability to guide the patient to accurately seek medical treatment in a timely manner.
2	Outpatient clinic	Disease types include: First, the ability to manage chronic diseases such as diabetes, hypertension, and heart disease. The second is the ability to control frequently occurring diseases such as neck, shoulder, waist, and leg pain and endocrine disorders. The third is the ability to deal with common diseases such as colds, fever, and gastritis.
3	Books	Generally, interviewees will choose to read books on basic medicine, such as general practitioner manuals, general medicine introductions, and also read books on psychology and doctor–patient communication to enrich their theoretical knowledge.
4	Internet	Download online resources such as Good Doctors.com and Dingxiang.com through the mobile APP to learn theoretical knowledge and broaden the ways of acquiring knowledge.
5	Treatment patients	The moral qualities that doctors need to treat patients: sincere attitude (2) *, good at communication (8), patient explanation (11), and empathy (3).
6	Doctors themselves	The doctor's moral cultivation: indifferent to fame and fortune (1), inner peace (4), self-sacrifice (1), firm belief (2).

Table 1. *Cont.*

No	Main Category	Concept
7	Regulation training	The regulation training time is three years, and content includes internal, external, women, children, health care, etc. During the study period, each department rotates to cultivate operational skills.
8	Continuous education	Participate in continuing education in the form of lectures and conferences every year.
9	Transfer of training	Learn theoretical knowledge in the form of class; you can choose a few basic courses, and rotate in the selected department about once every three months.
10	National mandatory training assessment	It is stipulated that the required credits can be completed before the assessment can be completed.
11	Autonomous training and assessment of community hospitals	Community hospitals regularly organize general practitioners to study or participate in lectures in major hospitals, and experts from major hospitals also regularly attend classes in community hospitals, forming an interactive training model.
12	Moral quality	General interviewees said: The professional ethics during the training period mainly involves communication skills, attitudes, people-oriented, belief-building, and other ideological content.
13	Theoretical knowledge	During the training, the professional knowledge learning mainly focuses on basic medical theory learning and the explanation of the latest development of chronic diseases in the community (such as diabetes, hypertension, etc.).
14	Practical skills	Skills and operation training mainly focuses on the mastery of basic operation skills and new technologies. The center is about lung rejuvenation, cardiovascular and cerebrovascular, and other first-aid operations.
15	Humanistic environment	The personal impact of the training on the general practitioner: The training is a summary explanation, with a deep memory point. In the work, I will often remind myself of the attitude and tone of communication with the patient to reduce misunderstandings and contradictions.
16	Skill levels	The personal impact of training on general practitioners: First, the knowledge level has enriched theoretical literacy and improved understanding of diseases. The second is the skill level, with a good understanding of new skills, especially in emergency training such as cardiopulmonary resuscitation. The improvement of doctors' personal operating ability is beneficial to accurately determine the patient's disease and provide effective treatment.
17	Patient satisfaction	Training effect: Increasing patients' trust and recognition of general practitioners. Most interviewees said that they have fixed "fans" and come to see doctors regularly. As the quality of general practitioners in community hospitals has been improved through training, the number of outpatient clinics has shown an increasing trend year by year.
18	Residents' medical awareness	Training effect: General practitioners have improved their own quality through training, mastered new knowledge and skills, and increased their awareness of general medical care in the process of communicating with patients.

Note: * indicates that the number in parentheses refers to the frequency of the vocabulary and similar vocabulary in all sorted out sentences of interviewees.

3.2. Axial Coding

Axial coding is based on open coding. It integrates scattered data and analyzes related content through cluster analysis to form different categories and establish connections, making the resulting code more complete and relevant and conceptualization, through detailed comparative and integrated analysis, the category formed by open coding (also known as the initial code)—"outpatient" and "door-to-door service" as the two main concept categories of "professional skill quality" in general practitioners' professional quality subcategories; take the initial category—"book" and "network" as two subcategories of the main concept category of "theoretical knowledge" in the professional quality of general

practitioners; take the initial category—"treating patients" and "doctors themselves" as two sub-categories of the main concept category of "professional ethics" in the professional quality of general practitioners; the initial categories—"regulation training", "continuing education" and "transfer training" are regarded as the "training form" in general practitioners training three sub-categories of the main concept category; take the initial category—"national prescriptive training" and "community hospital autonomous training" as the two sub-categories of the main concept category of "training assessment" in general practitioners training; take the initial category—"moral quality", "theoretical knowledge" and "practical skills" as the three subcategories of the main concept category of "training content" in general practitioner training; take the initial category—"humane environment atmosphere" as one sub-category of the main concept category of "environmental value" in the service value of general practitioners; the initial category—"skill level" and "patient satisfaction" are regarded as the main concept category of "technical value" in the service value of general practitioners two sub-categories; the initial category—"residential medical awareness" is regarded as a sub-category of the main concept category of "information value" in the service value of general practitioners. After repeated comparison and integration, nine conceptual categories (similar to secondary categories) were refined, as shown in Table 2.

Table 2. Main concept categories and content.

No	Main Category	Concept
1	Professional ethics quality	It summarizes the professional ethics quality of general practitioners from two aspects: treating patients and doctors themselves.
2	Theoretical knowledge	Theoretical knowledge is a necessary professional quality for general practitioners, and books and the Internet are important ways for them to obtain basic content.
3	Professional skills quality	The form of outpatient service requires general practitioners to have the ability to manage chronic diseases, control frequently occurring diseases, and handle common diseases. The form of door-to-door service requires general practitioners to have health management skills, rehabilitation training skills, and disease prevention skills.
4	Training form	The training forms mainly include regular training, continuing education, and transfer training.
5	Evaluate training	The assessment units are national training assessment and community hospital independent training assessment
6	Training content	The training content is related to the professional quality of general practitioners, including three aspects: ethics, theoretical knowledge, and skills.
7	Technical value	The training enriches the theoretical knowledge of general practitioners and effectively improves their practical skills, especially the improvement of operating skills for handling emergencies. At the same time, the increase in patient satisfaction has prompted a continuous increase in the number of outpatient services.
8	Environmental value	Through the humanistic qualities formed by the exchanges and communication between doctors and patients after training, a good environmental atmosphere is created for community residents.
9	Information value	In the training process, general practitioners accept advanced knowledge and can provide general medical service information and medical progress in time, so that they can effectively answer questions raised by residents.

After clustering and analyzing the data, it is found that the nine concepts obtained are related. According to the causal relationship and logical sequence, they are classified and summarized into three major types of relationships, as shown in Table 3.

Table 3. Three types of relationships based on axial coding.

No	Relationship Category	Concept of Influence Relationship (Corresponding Code)	Relationship Connotation
1	Professional quality	Professional ethics quality: Doctors themselves ① indifferent to fame and fortune (1-3-1) ② inner peace (1-3-2, 10-3-2, 4-3-2, 24-3-2) ③ self-sacrificing (1-3-4) ④ strong faith (24-3-1, 22-3-1); Treat patients ① sincere attitude (3-3-1, 6-3-2) ② good at communication (1-3-4, 2-3-2, 6-3-3, 11-3-1, 16-3-1, 18-3-2, 22-3-2, 33-3-2) ③ explain patiently (1-3-3, 5-3-3, 10-3-1, 12-3-4, 13-3-3, 23-3-1, 24-3-3, 28-3-2, 32-3-1, 35-3-5, 36-3-2) ④ empathy (2-3-1, 3-3-2, 28-3-1) Theoretical knowledge: books (5-4-2, 20-4-2, 26-4-4, 35-4-4); network (8-4-3, 26-4-5, 4-4-3, 35-4-2, 31-4-3) Professional skill quality: Outpatient ① chronic disease management ability (1-1-1, 8-1-1, 10-1-1, 12-1-1, 13-1-1, 22-1-1, 23-1-1, 24-1-1, 26-1-1, 28-1-1, 33-1-1, 34-1-1, 35-1-1) ② common disease treatment ability (2-1-1, 3-1-1, 5-1-1, 6-1-1, 11-1-1, 16-1-1, 18-1-1, 24-1-1, 26-1-1, 31-1-1, 32-1-1, 35-1-1, 36-1-1) ③ ability to control frequently occurring diseases (4-1-1); Door-to-door service ① health management skills (2-1-2, 5-1-2, 12-1-4, 23-1-2, 28-1-2, 31-1-2, 32-1-2, 36-1-2) ② rehabilitation training skills (1-1-3, 4-1-2, 11-1-2, 28-1-2) ③ disease prevention skills (28-1-2)	The most fundamental thing for a doctor is to have a heart of "the benevolent loves others", and a good professional ethics is the inner soul of the spiritual level of a doctor. From the doctor's point of view, indifference to fame and fortune, inner peace, self-sacrifice, and firm conviction are the basic characteristics of personal charm. A sincere attitude, good communication, patient explanation, and empathy are the good moral qualities that general practitioners need to have when facing patients. In addition to internal literacy, general practitioners also need to have profound theoretical knowledge, professional skills, and other external qualities.
2	Training	Training form: regular training (8-4-3, 10-4-1, 12-4-1, 36-4-2); continuing education (6-4-2, 12-4-4, 16-4-2, 24-4-1, 32-4-1, 33-4-2); transfer training (13-4-1, 18-4-1, 33-4-1) Training assessment: National regulations (1-4-4, 4-4-1, 5-4-1, 8-4-1); community hospital autonomy (1-4-5, 4-4-2, 5-4-3, 10-4-2, 11-4-2, 16-4-4, 22-4-2, 34-4-2) Training content: moral quality (1-4-2, 2-4-2, 5-4-4, 26-4-3, 28-4-2, 31-4-1, 35-4-5, 36-4-3); theoretical knowledge (13-4-5, 23-4-2, 26-4-2, 32-4-2, 34-4-3); skills (1-4-3, 2-4-1, 8-4-2, 10-4-3, 11-4-1, 26-4-1, 28-4-1, 35-4-3)	The professional quality of general practitioners determines the trust and satisfaction of patients. Training is an effective way to improve one's own professional quality, mainly involving three aspects of training form, assessment, and content. The main forms of training are planned training, continuing education, and transfer training. The assessment is organized by both the state and community hospitals. The training content is mainly set according to the basic quality of general practitioners.
3	Service value	Technical value: skill level (11-5-3, 13-5-3, 16-5-1, 26-5-1, 35-5-1, 34-5-2, 32-5-1, 31- 5-1, 2-5-1, 3-5-1, 6-5-1, 10-5-1, 11-5-1, 24-5-1, 34-5-1, 31-5-2, 6-5-2); patient satisfaction (11-6-4, 12-6-2, 24-6-3, 26-6-3, 2-6-1, 3-6-1, 22 -6-1, 28-6-2, 31-6-3, 36-6-2) Environmental value: humanistic environment atmosphere (2-5-2, 11-5-2, 35-5-3, 36-5-1) Information value: residents' medical awareness (1-6-1, 10-6-2, 13-6-1, 33-6-1)	Through training, the technical value, environmental value, and information value of general practitioners have been realized. The realization of technical value is due to the improvement of skill level, which increases patient satisfaction. The realization of environmental value is the promotion of moral quality, which has shaped a good humanistic environment. The realization of the value of information is the acceptance and learning of new knowledge and advanced technology in the training process, which has a certain positive effect on the improvement of residents' medical awareness.

3.3. Selective Coding

The purpose of this research is to construct the professional quality dimension of general practitioners as a basis to explore the influence pathways of professional quality on service value. Research on the training influences pathways of quality and service value. The core issue of the research can be conceptualized as a "research on the relationship between general practitioners' professional quality, training, and service value ". Figure 1 shows the core concept's control structure over other concepts.

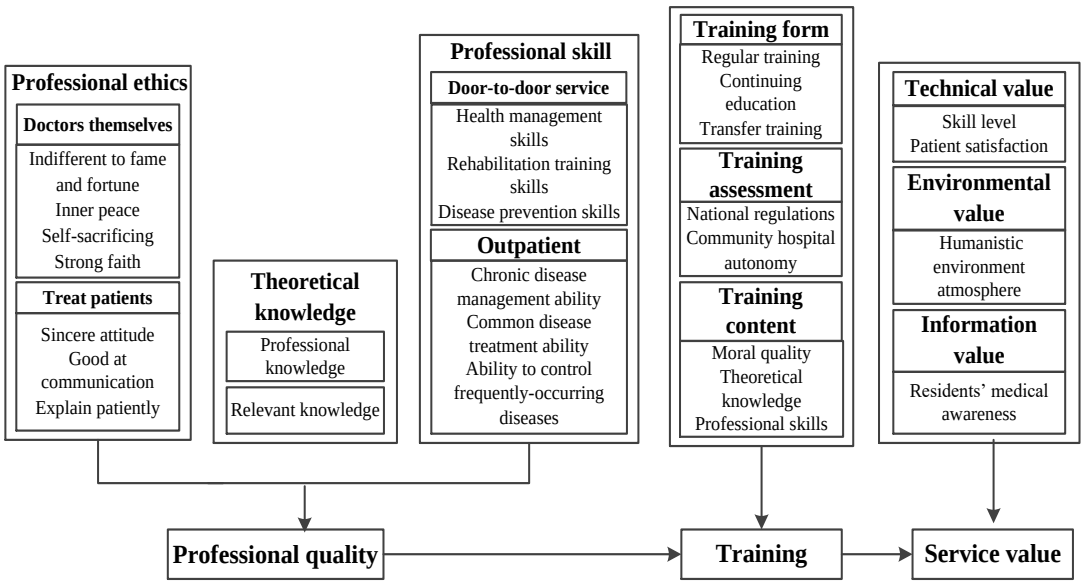

Figure 1. The training path model of general practitioners' professional quality to its service value.

As shown in Figure 1, the internal relations between the concepts embodied in the "training path model of professional quality and service value of general practitioners" are as follows: (1) There is an inevitable connection between the concepts, which is mainly attributed to the discussion of professional ethics and theoretical knowledge in professional quality and the service value generated by the training of professional skills; (2) the three levels of professional quality: Internal morality–external knowledge theory–practical skills operation constitute the dimension of professional quality; (3) training is based on professional quality three dimensions are the main content. In terms of moral training, humanities such as inner peace, self-sacrificing, and good communication are mentioned. In terms of theoretical knowledge, special attention is paid to the training of new medical knowledge. Skills training is more prominent for new skills and first aid training; (4) after training, the service value of technology, environment, and information has been realized.

3.4. Theoretical Saturation Test

The researcher will use the data of 13 interviewees to test the theoretical saturation according to the three-level coding process. In this process, we have not found any new concept categories, and there is no relationship different from the established relationship between categories; therefore, it can be judged that the theoretical model is saturated. From more interview data, the researcher chooses the following six pieces of information as evidence:

(1) We will regularly visit the homes of rural residents, mainly to do some basic health management tasks, such as helping the elderly to regularly measure blood sugar and blood pressure, etc. For postoperative patients, we will also be responsible for rehabilitation training and guidance; I also observe the living conditions of the elderly and do a good job in disease prevention. (28-1-2 "door-to-door service").

(2) Develop long-term management plans for patients with chronic diseases such as diabetes, hypertension, and heart disease. For frequently occurring patients with neck, shoulder, back, and leg pain, endocrine disorders, and disease control. For common colds, fevers, and gastritis, the sick patient has the ability to deal with the disease in time. (25-1-1 "outpatient")
(3) Our regular prescriptions for chronic diseases are prescribed on a monthly basis, and he will come to you to prescribe them before he finishes his medicine. In this situation, we also try to explain patiently to patients. (9-3-2 "patience explain")
(4) Our own unit will also organize some training, and there will be more training in general business. (9-4-1 "community hospital autonomous training")
(5) After the training, you can indeed learn knowledge, gain some new knowledge, and use some new drugs. After all, you have graduated many years ago, and your knowledge is updated quickly. If you do not study, you will not be able to master it. (15-5-1 "theoretical knowledge")
(6) After training, there will be a certain impact on the patient's satisfaction. Because the patient is selective, he thinks that he will trust you after he has asked you a few times to solve the problem. I will come to you, may leave a phone call, and call you when I have something to do. (15-6-1 "patient satisfaction")

4. Analysis of Coding Results

In this study, 37 general practitioners were interviewed in depth from 12 community health service hospitals, and the interview voice was transformed into the text as the original data. Then, the three-level coding forms (open coding, axial coding, and selective coding) followed the procedural grounded theory to refine higher-level categories step by step and connected the internal logical relationship between the professional quality, training, and service value of general practitioners. Finally, the "training path model of general practitioners' professional quality and service value" is constructed.

(1) It has formed a three-dimensional dimension of the professional quality of general practitioners, that is, the quality of professional ethics, theoretical knowledge, and professional skills.
First of all, noble professional ethics is the premise of being a qualified general practitioner and the soul of this profession. As a code of conduct, professional ethics are formed in the long-term medical practice of medical staff. It is the moral concept and moral behavior that every medical staff should have. Especially for general practitioners with strong service, it highlights the importance of their professional ethics. The biggest difference between general practitioners and specialists is that specialists manage diseases, while general practitioners manage people, and people-centered is the core concept of their practice. General practitioners mainly take the family as the unit, take the maintenance and promotion of overall health as the direction, and participate in the long-term physical and psychological life cycle responsible care process of individuals from birth to death. In this process, they play a variety of roles, such as educators, consultants, and health guardians. They are medical talents with a high degree of integration. It can be seen that it is extremely important to maintain long-term and effective communication with patients and always understand their needs, which puts forward higher requirements for the internal cultivation and noble professional ethics of general practitioners [41]. From the personal perspective of general practitioners, the reality of lower income and fewer promotion opportunities require them to have the noble character of weak fame and wealth, maintain inner peace for the complex nature of work, and have firm faith in the face of difficulties. Only general practitioners with these noble characteristics can contribute to their work. The formation of high professional ethics quality of general practitioners is a process of continuous accumulation and perception. It is a very key psychological dimension of professional quality. When general practitioners work and live in a high-intensity and stressful environment for a long time, they are prone to form

negative emotions, such as anxiety and depression, and their mental health status will change to varying degrees. Especially in the recent outbreak of the new coronavirus epidemic, the general practitioner's psychological endurance capacity has put forward higher requirements. It requires not only the general practitioner's psychological state of self-sacrifice and firm belief, but also the need to consider the patient's mood, communicate effectively and understand the importance of empathy.

Secondly, in addition to mastering basic professional knowledge, such as internal medicine, surgery, gynecology, and pediatrics, general practitioners should also understand and learn other theoretical knowledge, such as psychology and interpersonal science, because the main feature of general practice is to serve patients with an overall medical view and a systematic way of thinking. For example, general practitioners should not only pay attention to the patient's disease, but also observe the changes in the patient's mood and the factors that may lead to the disease, such as the surrounding environment; they should even predict the possible diseases in the future according to the current patient's physical condition—all of this to prevent the occurrence of diseases, prevent or shorten the time of future diseases in advance, or transfer patients in time according to the patient's physical condition, and share the pressure of medical treatment for large hospitals [42,43]. This requires general practitioners to have a comprehensive reserve of theoretical knowledge in order to improve the accuracy of judging diseases and reduce the risk of miscalculation. In the process of growing up, general practitioners should also pay attention to their in-depth research on a certain aspect of professional knowledge. In this way, while training general practitioners to have the overall concept, they will also establish unique thinking required for hard research.

Finally, the professional skills of general practitioners are not only the core component of professional quality, but also the embodiment of the practical workability of general practitioners. The professional skill quality of general practitioners mainly includes door-to-door service and outpatient service. In recent years, the state has gradually attached importance to door-to-door service, mainly because the aging population has led to the gradual increase of disabled, elderly people in China. In order to meet the medical needs of these patients, higher requirements are put forward for general practitioners' health management skills, rehabilitation training skills, and disease prevention skills [44]. At present, there are many elderly people in community clinics. Chronic diseases (such as diabetes, hypertension, and heart disease) are very common diseases in the elderly. Therefore, general practitioners should have the ability to manage chronic diseases and control the development of patients' diseases as much as possible. The other group is the residents near the community. Generally, people with common diseases (such as colds, headaches, etc.) will choose the community hospital close to home for treatment, which requires the general practitioner to have the ability to deal with common diseases. In addition, some patients suffer from frequently occurring diseases all year round (such as neck, shoulder, waist, and leg pain, endocrine disorders, etc.), and will also choose a more convenient community hospital to regulate their bodies. Therefore, general practitioners should have the ability to control the frequently occurring diseases of patients.

(2) The internal relationship model among general practitioners' professional quality, training, and service value is established.

Specifically, professional ethics, theoretical knowledge, and professional skills, as the dimensions of general practitioners' professional quality, can be improved and improved through training, so as to further realize their technical value, environmental value, and information value. At present, the most important way to improve doctors' professional quality and skills is to improve doctors' theoretical and practical skills through training; therefore, the state should pay attention to vigorously carrying out the standardized training of general practitioners and strengthening the construction of grassroots health personnel.

Training mainly includes standardized training, job transfer training, and continuing education. The standardized training is aimed at medical students. The training focuses on basic theories, clinical skills, and basic medical and health practice. Through training, most of the trainees reported that their professional knowledge level and skills, teamwork, and learning ability had been significantly improved, further promoting the realization of the technical value of general practitioners. The job transfer training is aimed at qualified grassroots on-the-job professional doctors or professional assistant doctors. The content of job transfer training is also carried out around the professional quality of general practitioners, mainly including knowledge, skills, and other training. The emphasis on mental health and communication skills has also increased. After the training, appropriate adjustments should be made according to the service effect. The training is gradually strengthening the application of general practice medicine and the content of knowledge and skills in the field of preventive medicine. As the types of trainees for job transfer training are complex, it is necessary to implement targeted training for trainees at different levels. Therefore, trained general practitioners are conducive to realizing their environmental value, technical value, and functional value. The improvement of general practitioners' medical knowledge, medical experience, and ability to quickly handle emergencies is conducive to the further realization of technical value, and the improvement of family planning technical guidance, disease prevention, health care, and health management services is conducive to the further realization of functional value.

The cultivation of humanistic quality needs long-term accumulation and precipitation. For general practitioners, the cultivation of humanistic quality is gradually concerned in training. Through the establishment of an assessment mechanism suitable for the innovative teaching model, more subjective training content is added, and students' noble humanistic feelings, such as fraternity and empathy, are improved. In order to guide students to apply theory to practice, use the form of case analysis to simulate and restore the authenticity of real events, so as to constantly adjust and deepen the humanistic concept, which plays an important role in realizing good environmental values for general practitioners.

5. Conclusions

According to the research steps of the program-rooted theory, we constantly extract higher-level categories through the form of three-level coding, and finally refine the internal logical relationship between the professional quality, training, and service value of general practitioners, so as to build a training path model between the professional quality and service value of general practitioners.

Firstly, the concept of professional quality of general practitioners is deeply analyzed from the internal spiritual level of professional ethics to the material level of theoretical knowledge and then to the practical level of professional skills.

Secondly, training has an obvious impact on the professional quality of general practitioners. Training forms mainly include regular training, continuing education, and job transfer training. The assessment is organized by both national and community hospitals. The main content of the training is based on the professional ethics, theoretical knowledge, and professional skills of general practitioners. The coding results show that these three aspects of professional quality have been effectively improved through training.

Finally, it clarifies the internal relevance of the professional quality, training, and service value of general practitioners. The professional quality of general practitioners has been effectively improved through training, thus realizing their technical value, environmental value, and information value. The realization of technical value is due to the improvement of skill level, which increases patient satisfaction. The realization of environmental value is the promotion of moral quality, which shapes a good humanistic environment. The realization of information value is the acceptance and learning of new

knowledge and advanced technology in the training process, which plays a positive role in improving residents' medical cognition.

6. Theoretical Contribution and Practical Value

6.1. Theoretical Contribution

This paper breaks through the previous research paradigm of analyzing the relationship between variables based on the existing literature. We mainly use the procedural grounded theory method to mine and discover the internal relations between variables from complex phenomena based on real materials. Through continuous refinement and summary, a theoretical model more in line with the actual development needs can be established. Therefore, this article realizes the exploratory construction of the theoretical model of the training path from nothing to the service value of general practitioners. The theoretical model constructed in this study not only enriches the research in this field, but also provides a certain theoretical reference value for the research in other related fields.

6.2. Practical Value

The construction of the concept model of general practitioners' professional quality not only provides a certain reference value for the government and community hospitals to make scientific management decisions and plans, but also provides directional guidance for general practitioners to clarify their own career growth. From the practical level, as the "residents' health gatekeepers", the professional quality of general practitioners is the basis for the implementation of the hierarchical diagnosis and treatment system. However, after the professional quality of general practitioners has been improved through training, the realization of their service value can be affected by increasing patients' trust and influencing their medical behavior. This has certain practical significance to further implement the policy of "graded diagnosis and treatment", and alleviate the problem of it being "expensive and difficult to see a doctor".

7. Managerial Implications

Firstly, we scientifically arrange and optimize the training content and form so as to highlight the characteristics of general practice and meet the work and development needs of general practitioners so as to achieve the effect of learning for application and avoid the disconnection between the training content and actual work [45–47].

Secondly, in order to broaden the scope of theoretical knowledge learning, we make them master medical preface information by providing more opportunities to go to large hospitals, high-end universities, or study abroad, and bring the latest ideas to the community and patients, so as to promote the realization of their own information value; establish courses to improve communication skills, solve the language and other communication barriers between patients and doctors, actively learn foreign teaching experience, introduce standardized patients and adopt the form of scenario simulation to enhance the training effect, which is conducive to creating a good humanistic environment and realizing the environmental value of general practitioners.

Finally, in terms of training methods, case discussion, skill operation guidance, general practice teaching ward rounds, independent practice opportunities, and overall rotation department arrangement are mostly used to improve their professional ability. It is suggested that case teaching should be used in clinical rotation training to combine theory with practice. Training clinical thinking ability of general practitioners can fundamentally improve their clinical skills. This is conducive to the realization of its information value and technical value.

8. Limitations and Future Research

This study uses the grounded theory method to construct the "training path model of general practitioners' professional quality and service value", but there are still deficiencies. (1) The grounded theory method used in this study focuses on finding the internal

relationship between variables in the way of logical deduction. This research paradigm has been considered as important by many scholars. At the same time, quantitative methods should be further used to measure the model in order to test its scientific nature. However, due to space constraints, this study did not verify this. (2) Although the grounded theory has no specific requirements for the number of data sources and only needs to reach the theoretical saturation, there may be a phenomenon that the research results will change with the increasing number of areas and people investigated. In future research, we will use the empirical method to test the scientificity and feasibility of the "training path model of general practitioners' professional quality and service value", and use the QCA method to explore pathways affecting the improvement of general practitioners' professional quality, so as to better realize the service value from the perspective of improving the professional quality of general practitioners. This will be the main issue that we need to further study in the future.

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