Leadership, infrastructure and capacity to support child injury prevention: can these concepts help explain differences in injury mortality rankings between 18 countries in Europe?

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Background: Mortality and morbidity rates, traditionally used indicators for child injury, are limited in their ability to explain differences in child injury between countries, are inadequate in capturing actions to address the problem of child injury and do not adequately identify progress made within countries. There is a need for a broader set of indicators to help better understand the success of countries with low rates of child injury, provide guidance and benchmarks for policy makers looking to make investments to reduce their rates of fatal and non-fatal child injury and allow monitoring of progress towards achieving these goals. This article describes an assessment of national leadership, infrastructure and capacity in the context of child injury prevention in 18 countries in Europe and explores the potential of these to be used as additional indicators to support child injury prevention practice. Methods: Partners in 18 countries coordinated data collection on 21 items relating to leadership, infrastructure and capacity. Responses were coded into an overall score and scores for each of the three areas and were compared with child injury mortality rankings using Spearman’s rank correlation. Results: Overall score and scores for leadership and capacity were significantly negatively correlated to child injury mortality ranking. Conclusions: Findings of this preliminary work suggest that these three policy areas may provide important guidance for the types of commitments that are needed in the policy arena to support advances in child safety and their assessment a way to measure progress.

Introduction

Injuries are the leading cause of death for children aged 5–19 years in the WHO European Region, with approximately 42,000 children dying from unintentional injuries each year.1 While injury is increasingly being recognized as a key health issue for Europe’s children, enhancing child safety at the country level is a long road made more difficult by a lack of comprehensive evidence-based plans of action. Traditionally, the indicators of country progress that have received the most attention are outcome measures such as child injury mortality and morbidity rates.3–6 These indicator measures, if used alone, are limited in their ability to explain differences in child injury mortality between countries, provide limited guidance in how to move forward and do not quantify progress made within countries to address the problem.7 In order to begin to address these limitations, a broader framework is required that takes into account not only the outcomes of prevention efforts but also the processes involved in achieving those ends. While to date, a set of indicators of this ‘upstream’ action to support national policy does not exist in the injury area, there is some suggestion in the literature that leadership, infrastructure and capacity are critical concepts for which useful action indicators could be developed.8,9

Leadership

National leadership deals with commitment, directed action and investment and coordination.8,18 Commitment of top political leaders is critical to ensuring establishment of injury as a priority issue within government policy and the allocation of requisite resources.8,18 Demonstrated governmental leadership is seen as an important prerequisite to achieving many of the evidence-based solutions that have been identified within the field of child injury prevention, particularly at the level where legislation and enforcement are the most effective prevention route.19,20 National leadership is also important to sustaining initial efforts and achieving successful partnerships and coordinated implementation at regional and local levels.21

Infrastructure

In the framework of injury prevention, infrastructure refers to the basic tools like adequate data to describe the issue and organizations with a clear mandate to support prevention efforts that are necessary to ensure effective use of scarce resources.22 The creation and maintenance of infrastructure also requires concerted ongoing efforts to ensure the expertise necessary to analyse and report data in useful formats for decision-making are available.23 For the purposes of this study, we focused on issues related to data infrastructure, including availability of data and surveillance products that would support injury prevention efforts.

Capacity

Capacity in the context of injury prevention literature is defined as the development, fostering and support of resources and relationships at individual, organizational, inter-organizational and systems levels.20 A knowledgeable and networked group of skilled stakeholders is necessary to carry out effective planning, implementation and evaluation of prevention strategies, to ensure exchange of knowledge on what works
and what does not and the coordination of efforts between national, regional and local levels.

In 2005, when the current study was conducted there was no literature that attempted to quantify national injury leadership, infrastructure and capacity for the purposes of measuring change over time or making international comparisons and there had been no empirical assessment of the extent to which these concepts are associated with national mortality rates. This article begins to address this gap and explores whether these concepts could serve as a reasonable basis for the development of useful action indicators to support national efforts to address the child injury issue. The aim of this article is to describe the national leadership, infrastructure and capacity to support child injury prevention in 18 countries and to quantify the association between national leadership infrastructure and capacity and national child injury mortality rates.

**Methods**

**Study design**
The study design was a cross-sectional ecological study with country as the unit of analysis. Using this geographical comparison, we sought to explore the association between scores of leadership, infrastructure and capacity at the national level and national child injury mortality rates.

**Setting and population and participants**
The focus was at the country level in 18 countries in the European Economic Area: Austria, Belgium, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Italy, The Netherlands, Norway, Poland, Portugal, Spain, Sweden and Northern Ireland and Scotland as constituent countries of the UK. Participants were members of the European Child Safety Alliance, active child safety advocates in their respective countries and chose to participate in a large European Commission funded project of which the current work is part.21

**Variables and instruments**
Twenty-one measures were assembled to form an assessment for the three areas of leadership, infrastructure and capacity. Measures were developed from preliminary work done as part of a previous project that applied the Balanced Scorecard framework to the issue of national child safety, including developing and testing indicators of financial (leadership), internal operations (infrastructure) and learning and growth (capacity) to try to more completely describe what is happening in countries regarding child safety.6 The measures for each area (itemized in tables 1–3) varied in number as they reflect those measures for which an action indicator was seen as being reasonably valid and reliable.6,7

An English language computer-based assessment tool was developed to collect data for all but one of the 21 measures. Data for that measure came from the results of a related study examining the feasibility of conducting burden of child injury studies in Member States in European Union.24 Prior to completion by participating countries, the draft tool underwent three levels of review and revision. The project expert group, which included an expert in indicator development, and an external group of international experts both reviewed the assessment tool before it was piloted in three of the countries, Austria, Italy and Portugal. The final revised draft was reviewed with the partners coordinating data collection in each of the 18 countries to ensure common understanding of the questions.

**Data collection process**
In 15 countries, where the instrument had not been piloted the assessment was administered in full. In the pilot countries, the original data were used with additional information for items added and/or clarified following the review process. The European Child Safety

<table>
<thead>
<tr>
<th>Table 1 Indicators of national-level leadership as it relates to child injury prevention in 18 countries in Europe and leadership score out of 20</th>
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<tr>
<td>Government department/ministry that is responsible for national coordination of child safety activities</td>
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<tr>
<td>Specific contact or focal point for each departments/ministry involved in child safety</td>
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<tr>
<td>Injury prevention identified as a national priority by the government</td>
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<tr>
<td>Government led national injury prevention strategy with child safety targets</td>
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<td>Dedicated government budget for national prevention programmes</td>
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<td>Dedicated government budget for research related to child safety</td>
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<td>Dedicated government budget for capacity building</td>
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<td>Dedicated government budget for a national steering group/task force</td>
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<td>Dedicated government budget for a coordinating network/organization</td>
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<td>Organization responsible for national coordination of child safety activities</td>
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<tr>
<td>Leadership score/20 possible points</td>
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</table>

NL = The Netherlands; Ni = Northern Ireland; De = Germany; Cz = Czech Republic; Dk = Denmark; Fr = France; Se = Sweden; Hu = Hungary; It = Italy; No = Norway; Pt = Portugal; Sc = Scotland; Au = Austria; Pl = Poland; Es = Spain; Be = Belgium; Ee = Estonia; Gr = Greece
a: Given the decentralization of health related policy to constituent countries, Ni and Sc are considered as individual countries of the United Kingdom within this analysis
b: Score is a sum of responses for each item where Yes = 2 points, Progress towards a yes = 1 point; No = 0 points
Table 2 Indicators of national-level infrastructure as it relates to child injury prevention in 18 countries in Europe and infrastructure score out of 12

| Measure of infrastructure | DK | SE | CZ | PL | AU | NL | NO | GR | GE | IT | HU | NI | PT | SC | EE | FR | BE | ES |
|---------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Organization(s) with specific mandate to coordinate injury data and produce reports to support action | 2  | 2  | 1  | 2  | 2  | 2  | 2  | 2  | 0  | 2  | 2  | 2  | 0  | 0  | 2  | 2  | 0  | 2  | 0  |
| Annual or biannual report that includes minimum information on all child injury deaths regularly produced | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 2  | 0  | 2  | 0  | 0  | 2  | 0  |
| Studies exploring links between the risk of child injury death and determinants | 2  | 2  | 2  | 0  | 0  | 0  | 2  | 2  | 2  | 0  | 0  | 2  | 0  | 0  | 0  | 0  | 2  | 0  | 0  |
| Published a burden of injury report that includes data on children | 2  | 2  | 2  | 2  | 2  | 2  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Data to perform an analysis of the burden of child injury available | 2  | 1  | 2  | 1  | 1  | 1  | 1  | 0  | 2  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Mortality and morbidity data on child injury are reasonably available at the national level | 2  | 2  | 2  | 2  | 2  | 2  | 1  | 1  | 2  | 2  | 2  | 0  | 0  | 1  | 1  | 2  | 0  | 0  | 0  |
| Infrastructure score/12 possible points | 12 | 11 | 10 | 10 | 9  | 9  | 8  | 7  | 7  | 6  | 6  | 6  | 6  | 5  | 5  | 5  | 3  | 2  | 0  |

Table 3 Indicators of national-level capacity as it relates to child injury prevention in 18 countries in Europe and capacity score out of 10

<table>
<thead>
<tr>
<th>Measure of capacity</th>
<th>DK</th>
<th>DE</th>
<th>NI</th>
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<th>AU</th>
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<th>FR</th>
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</thead>
<tbody>
<tr>
<td>Organization(s) with specific mandate to distribute information on best practice and/or facilitate uptake of good practice</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<td>0</td>
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<tr>
<td>Network/structure or healthcare system that can facilitate injury prevention education for expectant parents and/or parents of children 0-4 years old and is used for that purpose</td>
<td>2</td>
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<td>0</td>
<td>2</td>
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<tr>
<td>National capacity building initiatives that are either specific to injury prevention or include injury prevention content</td>
<td>2</td>
<td>2</td>
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<td>2</td>
<td>2</td>
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<tr>
<td>Country has a network for child injury prevention practitioners and researchers</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Country hosts (or it has hosted in past) a national conference or regional meeting on child injury prevention or a national conference that includes child injury prevention</td>
<td>2</td>
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<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Capacity score/10 possible points</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>8</td>
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<td>7</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>2</td>
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</table>

Alliance’s partner in each country (either an academic, civil servant employed by the national government or representative of a national NGO who represent child safety on their country’s behalf) coordinated data collection. Data collection required that appropriate individuals within government and non-government organizations were contacted to obtain accurate information on assessment items. Data collection took place in 2005/2006 with the majority of countries completing the assessment within 4 months.

Data management and analytic strategy

Results were downloaded to Excel, reviewed for completeness and where there was missing information or questions, the country partner was contacted. Responses were coded to allow summary scores for each area and an overall score: 2 points for a yes, 0 points for a no and 1 point if there was progress towards a yes (for example, if a strategy was in progress of being developed the item was coded as a 1). Scores were treated as ordinal data as it was judged that the intervals between the three points could not be treated as equivalent. Countries were ranked according to their overall score and leadership, infrastructure and capacity scores. Countries were then ranked to reflect their safety performance as measured by 5-year average child injury mortality rates calculated using the WHO Mortality database for the five most recent years available (in most cases 1998–2003). The resulting ranks in scores and child injury mortality were compared using Spearman’s rank correlation.

Results

Assessment forms were completed for all 18 participating countries. The results are summarized in tables 1–3.

Leadership

Leadership scores ranged from 0 to 18 out of a possible 20. The Netherlands and Northern Ireland had the highest scores with the lowest scores in Greece and Estonia. All but three countries, Estonia, Greece and Sweden, indicated that injury prevention was identified as a current national priority by government. However, only three, Austria, The Netherlands and Northern Ireland, indicated that there was a government led national injury prevention strategy with child specific targets at the time of data collection. While all 18 countries indicated that they had national government departments/ministries with some responsibility for child safety activities, only seven, Czech Republic,
Germany, The Netherlands, Northern Ireland, Norway, Poland and Sweden, reported a lead government department/ministry that is responsible for national coordination of child safety activities. One other, France, reported that two ministries share this responsibility.

Few countries indicated that dedicated funds were available to support child injury prevention. Just half of the 18 countries indicated that national government departments have a dedicated budget for the development/support of national prevention programmes related to child safety. Six or fewer countries reported dedicated funding for a national coordinating network/organization, a national steering group/task force on the issue, capacity building related to child safety or research. Only The Netherlands, Northern Ireland, Germany and Sweden reported dedicated funding for three or more of the items related to dedicated funding.

**Infrastructure**

Infrastructure scores ranged from 2 to 12 out of 12, with Denmark and Sweden having the highest scores and Spain and Belgium the lowest. Just over half of the countries (61.1%) indicated the existence of an organization whose mandate specifically includes coordinating injury data including data on children and producing reports to support action. However, while all have population-based fatality data, recent data are not available to all. For example, the most recent year of mortality data available to child injury prevention practitioners in Belgium at the time of data collection was 1998. Access, availability, coding and coverage of hospitalization and emergency department data related to injuries vary greatly by country. Hospitalization data are not coded for external cause of injury, which limits the utility of data available, and not all countries collect population or sample-based emergency department data.

Only seven countries, Austria, Denmark, Estonia, The Netherlands, Norway, Poland and Sweden had a published burden of injury report that included children; however, these reports most often expressed injury burden in strict terms of mortality and for those that did have data for children were not presented separately.

**Capacity**

Capacity scores ranged from 2 to 10 out of 10. Scotland, Northern Ireland, Germany and Denmark all had 10 out of a possible 10, while Belgium and Spain shared the lowest score.

All participating countries but Belgium and Poland indicated the existence of national capacity building initiatives for those working in the area of injury prevention that are either specific to child injury prevention or include child injury prevention related content. However, these vary greatly in target group and content, there is little coordination between sectors to ensure consistency of information and few countries reported attempts to comprehensively address basic levels of knowledge in key groups of child injury stakeholders.

All participating countries except Belgium, Poland and Spain reported one or more organizations whose mandate includes distributing information on evidence-based practice and/or facilitating or encouraging uptake of evidence in the area of injury prevention or safety promotion. Only Denmark, Germany France, Northern Ireland and Scotland reported the existence of a national network to facilitate exchange of information on injury prevention for children and only three of these (France, Northern Ireland and Germany) reported having even a directory of practitioners and/or researchers working in the area of child injury prevention that would allow practitioners from relevant sectors to locate and support one another.

**Comparison to overall child injury mortality rate**

The range in overall combined scores for leadership, infrastructure and capacity was 8–35 out of a possible 42, with the highest combined scores in The Netherlands, Northern Ireland, Denmark and Germany and the lowest in Belgium and Spain. Figure 1 illustrates the correlation between combined leadership, infrastructure and capacity score and child injury mortality rate. A statistically significant correlation was found \(r(16) = -0.71, P = 0.0004\), with countries with a higher leadership, infrastructure and capacity score also ranking better in terms of child injury related mortality. Countries with the highest leadership, infrastructure and capacity scores also tended to be in northern European countries, with central and Southern European countries having lower scores. When the relationship was examined for the three subareas within the leadership, infrastructure and capacity score, countries with higher scores for leadership and capacity had lower child injury mortality rates than those with lower scores \((r(16) = -0.69, P = 0.006\) and \(r(16) = -0.65, P = 0.02,\) respectively). However, there did not appear to be a clear relationship between rankings for infrastructure score and child injury mortality \((r(16) = -0.26, P = 0.32)\).

**Discussion**

The study demonstrated the feasibility and face validity of quantifying national leadership, infrastructure and capacity as they relate to child injury across countries using a standardized assessment tool. All measures were obtainable for all countries and the experts involved agreed that the measures were reasonable, reflected what was important for leadership, infrastructure and capacity in terms of advancing child injury prevention and that the range in data obtained reflected their experience.

Overall leadership, infrastructure and capacity scores varied greatly across the 18 participating countries; however, there did appear to be a general pattern with countries with higher leadership, infrastructure and capacity score having a better ranking for child injury related mortality. While experts agreed that all three components of the leadership, infrastructure and capacity score were important, only leadership and capacity were significantly associated with a country’s injury mortality rates ranking.

There has been only one previous study examining an aspect of leadership, infrastructure and capacity in the area of child safety. In an exploration of variations in injury-related legislation between OECD countries, Towner and Towner found that countries with a national child injury group/society were more likely to have more child safety supporting legislative measures in place than those without. The significant association between leadership and child mortality found in the current study may provide further support for this relationship given that countries with higher leadership scores reported greater investment in supporting activities that strengthen prevention efforts.

Due to the nature of the injury issue, the expertise to facilitate exchange of information, knowledge and experience is required across many sectors and mechanisms to ensure productive collaborative investment. This is true at the national level and even more importantly, the regional/local levels where most effective interventions are implemented or enforced.
We found that the countries with higher capacity scores were those that had invested not only in organizations whose mandate is to facilitate the exchange of information but also in varied mechanisms to disseminate that information. Belgium and Spain, two countries with marked regional differences, had lower scores for not only capacity but also infrastructure and leadership compared with countries with no such differences. This appears to underline the important role that government can take in facilitating coordination and communication of prevention efforts and dissemination of information on effective evidence-based strategies to ensure that stakeholders at all levels are well informed. Further, as many of the effective evidence-based strategies in child safety are policy related at the national level (e.g. legislation, product and environmental modification as it relates to laws and standards), leadership is an important precursor to such actions being implemented.

The fact that infrastructure appears less directly related to child mortality rankings does not necessarily mean that adequate infrastructure is not an important facilitator for effective injury prevention. It may be, however, that without clear leadership and capacity having data is not enough to lead to reductions in injury. Data are believed to be key to identifying priority issues and to evaluating prevention efforts. The results reported here can perhaps be explained by the fact that it is not the infrastructure alone that is useful for injury prevention but the integration of data outputs from surveillance systems into adequately led and resourced planning and strategy selection, implementation and evaluation that are important.

While association does not equal causation, our hypothesis is that leadership, infrastructure and capacity are key drivers to, and enablers of, the adoption, implementation and monitoring of effective injury prevention policy and programmes and resulting reductions in child injury. The current study does not allow the exploration of whether these concepts are drivers of effective reduction strategies, but it does provide evidence that there is a relationship between leadership, infrastructure and capacity and injury rates, suggesting that they are at least enabling. However, further research is required to clarify the nature of the relationship.

This is the first time, to our knowledge, that information on leadership, infrastructure and capacity has been used to establish a baseline for monitoring of an international-level project in the area of child public health in Europe, and certainly the first time the approach has focused on child safety promotion, although other subsequent initiatives have taken a similar approach. As an early attempt to measure the concepts of leadership, infrastructure and capacity as they relate to national child safety in Europe, it may be that our measures do not capture all critical aspects of these concepts. The method of data collection may also have led to some reporting bias. However, all attempts were made to overcome these limitations by having expert input into the development of items and by providing clear definitions, instructions, piloting of the assessment tool and training for those collecting the data. Given the initial state of such comparisons, we felt that obtaining responses from experts in the appropriate government or non-government organizations within each country was a reasonable and valid way to collect this information.

Data collection were restricted to national-level measures of leadership, infrastructure and capacity and did not take into account regional-based governance structures in countries. As such the central measures may not have reflected the true levels of these attributes across the country, particularly for those countries where regional governments decide policy on such issues. This impacted the leadership area the most, as measures focused predominantly on national government response to the issue of child safety. However, it has been established that the commitment and support of national government is critical to ensuring coordination and equity of efforts across countries in actions to address the issue.

Opportunities for improving the measures of leadership, infrastructure and capacity for use as action indicators for injury prevention were highlighted by the analysis. Dates of introduction of policies were not available for all measures in all countries and were, therefore, not included in the current analysis and it may be that ascertainment of such dates would help explain some of the differences or exceptions from the general patterns. There was no weighing of items within each of the three areas in the leadership, infrastructure and capacity assessment whereas little existing evidence from the child injury prevention field to suggest which items would be most critical. Research to provide the evidence base for weighting of items is required. It is also likely that some of these measures may have more of a combined than individual effect so that results depend on the overall environment and how policies come together to impact child injury rates. Further analyses to assess whether certain leadership, infrastructure or capacity items are more strongly correlated with child injury mortality rankings than others could create a smaller set of measures that are more critical than others to explaining differences in child injury reduction between countries. Understanding the sequencing and strength of relationships might also assist in a clearer understanding of whether leadership, infrastructure and capacity are drivers and/or enablers lower injury rates.

To date, the tools available to policy makers to understand differences in child injury mortality between countries and to provide guidance in how best to make, measure and benchmark progress have been limited. The information generated by the leadership, infrastructure and capacity assessment suggests that these policy areas may provide important guidance for the types of commitments that are needed in the policy arena to support advances in child safety. It is clear that leadership and capacity and to a lesser extent infrastructure play a critical role in the countries with lower ranking child injury-related mortality. As such this work represents an important starting point in examining critical factors in successful child injury prevention and it may be useful for countries with lower leadership, infrastructure and capacity scores to examine and emulate what has been done in countries with higher scores.

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A model of successful ageing in British populations

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Conflicts of interest: None declared.

Key points

- Assessment of leadership, infrastructure and capacity commitments provides one way to measure progress in child injury prevention.
- Leadership and capacity in particular are highly correlated with child injury mortality.

References