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RESEARCH PAPER

A critical examination of representations of context within research on population health interventions

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ABSTRACT

Research that fulsomely characterizes context improves our understanding of the processes of implementation and the effectiveness of interventions to improve the health of populations and reduce health inequalities. Context could be a key aspect to understanding what population health interventions best address underlying conditions that contribute to systematic differences in health status at the population level. Here, we present a ‘snapshot’ of representations of context in population health intervention research published recently in some influential journals in the field of public health. In general, we found that context was treated as a ‘black box’, or as something that needs to be ‘controlled for’. Context also was used to help explain intervention ‘failure’. There were few in-depth descriptions of the hypothesized pathways or mechanisms through which context and intervention (in combination or separately) influence population health. Recognizing that research on population health interventions can be less straightforward than research conducted under more ‘controlled’ (i.e. de-contextualized) conditions, we suggest that there is a great need for new theoretical and methodological work in this area.

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Population health intervention; context; intervention research; implementation; health inequalities; critical literature review

Introduction

Context is an important rubric through which to study the processes of intervention implementation. Context also is integral to understanding intervention outcomes. For example, detailed attention to context could reveal the reasons why intervention effects vary within and across locations. Close study of context might also reveal the means by which observed intervention effects depend upon or are produced as a result of interactions with particular contextual features. Context also could be a key aspect to understanding which interventions are equity enhancing (i.e. redressing systematic differences in health status that are deemed unfair or unjust) – as well as the inverse (Greaves, Hemsing, Poole, Bialystok, & O’Leary, 2014). We suggest that there is a need to better understand how context is represented within recent empirical studies of population health interventions – what some have coined ‘population health intervention research’ (CIHR Institute of Population and Public Health, 2009). Because journals heavily oriented towards mainstream public health have significant influence on this growing (but nascent) area of research (CIHR Institute of Population and Public Health, 2009), they

represent an important space within which to begin to critically examine the treatment of context and its relevance to understanding population health intervention outcomes.

Recently, some have suggested that research on context may be stalled as it pertains to PHIR (Hawe, Di Ruggiero, & Cohen, 2012). It remains common to see the representations of 'context' reported as superficial descriptions of the places where interventions are conducted or the dates when they occur (McCabe, West, Veliz, Frank, & Boyd, 2014). Few reports on context address people's social connectedness, their social locations, or their affinity with the intervention itself, with some notable exceptions (Fast, Shoveller, Small, & Kerr, 2013; Frohlich, Potvin, Chabot, & Corin, 2002; Institute of Medicine, 2005; Murphy et al., 2014). We suggest that many less well-described features of context reflect what Morten Hulvej, Ingholt, Sørensen, and Tjørnhøj-Thomsen (2014) have called the 'spirit of the intervention' and, as such, may be keys to understanding intervention effects at the population level – and to moving PHIR forward (Shoveller, Johnson, Prkachin, & Patrick, 2007). However, mainstream conceptualizations of RCTs as 'gold standard' for understanding intervention effects and their valorization of 'controlling' for context may pose challenges to the uptake of more robust treatments of context.

Our aim was to conduct a critical examination of recent empirical studies of population health interventions in order to present a 'snapshot' of the extent to which context is being (or not being) discussed in various influential journals at a particular moment in time. Our findings begin with a brief description of the types of interventions and the populations of interest and study designs used. We then analyze and synthesize information presented in the publications that describes or operationalizes context or attempts to explain how context might affect aspects of the intervention itself or its outcomes. After identifying the key ideas related to the treatment of context within these published studies, we discuss how new attention to context might benefit PHIR as well as some challenges in attempting to do so.

Methods

We began with an examination of descriptions regarding context in a subset of the published literature (2012–2013) in the realm of population and public health, focusing initially on descriptions of context, how it is operationalized, and how it is introduced or treated in explanations regarding intervention outcomes. To begin, we drew examples from a group of English-language journals within mainstream public health that we judge to have significant influence on PHIR; these journals are widely read, frequently publish studies that describe the outcomes of interventions intended to address population health concerns, and have relatively high impact factors. The selected journals were: *Epidemiology, the American Journal of Preventive Medicine, the American Journal of Public Health, Preventive Medicine, the Journal of Epidemiology & Community Health, the Annual Review of Public Health, Social Science & Medicine, Health & Place, BMC Public Health, and Implementation Science*. Within these journals, we electronically searched for articles that used both the subject heading 'intervention research' and the keyword 'context'.

Potentially eligible articles numbered 1287. From those, we reviewed titles, abstracts, and full texts and manually selected a subset of articles that met inclusion criteria. We included only studies of interventions that were population-based (policies, programs, and resource distribution approaches) (CIHR Institute of Population and Public Health, 2009; Hawe & Potvin, 2009), rather than focus solely on individually oriented and clinical interventions (e.g. cognitive behavioural therapy interventions were not included). Studies were included if their outcomes focused on direct measures of health status (e.g. BMI; current smoking status). We excluded articles if they *only* measured behavioural or attitudinal outcomes (e.g. condom use self-efficacy; intention to quit smoking), due to concerns about feasibility in light of the vast and diverse literature that focuses on behavioural or attitudinal outcomes. We also excluded all reviews, including systematic reviews and meta-analyses, we were interested in the ways that individual studies examined (or not) context. As a result, 21 articles formed the basis of our initial analysis.

We began by summarizing some relevant characteristics of the captured literature, including: (a) descriptions of the intervention; (b) population(s) of interest and study design; (c) descriptions of context; and (d) discussions of fidelity. Where data existed, we also extracted information pertaining to the hypothesized pathways through which the intervention influenced health. The extracted examples

were entered in a Microsoft Excel spreadsheet. Four researchers (JS, DG, RK, KT) participated in the article identification, selection, and screening; one researcher (JS) performed the initial extraction of information and preliminary analysis; all co-authors then participated in the ongoing assessment, analysis, and synthesis of information across papers (divergences between co-authors were resolved through discussions that included all co-authors and through multiple iterations of writing the analysis, which was co-developed by all co-authors).

During the next stage, we assessed how descriptions of context included the social situation or circumstances and the events surrounding interventions. Our analysis did not start with an a priori definition of context, as we did not want to limit our examination of the empirical examples by imposing a particular definition. However, we were informed by our readings of key papers published by other authors, particularly their examinations of context and the concepts that they employed (e.g. most recently that of Shareck, Frohlich, and Kestens (2014) and George, Scott, Garimella, Mondal, and Ved (2015), as well as others described below).

Thus, to begin, we noted descriptions of features of context within each of the articles. In addition to descriptions of the geographic location where the study was conducted (e.g. country, city), we also examined any descriptions presented in the articles to describe social and structural features of intervention context, including social stratification, cultural norms, or the existence of stereotypes based on gender, ethnicity, or age. We also examined descriptions of how context might have directly or indirectly shaped the implementation of interventions (i.e. fidelity). These descriptions were then compared and contrasted with descriptions of how the authors explained the influence of context on intervention outcomes.

The analysis presents a 'snapshot' of representations of context in population health intervention research published recently in journals that we judged to be highly influential in the field of public health. We use these examples to show how context is being (or *not* being) discussed in public health circles at a particular moment in time.

Findings

Descriptions of the intervention(s)

The interventions were wide ranging in scope and scale (see Table 1), including (but not limited to): school-based physical education curriculum; installation of bike lanes; removing health care fees for children under age 5 in Africa; enhanced programming for pregnant and parenting teens; and establishment of a referral system for suicide ideators, including counselling with a non-local health professional, along with vouchers for transportation. All articles included at least a few sentences about what constituted the intervention; however, none provided in-depth information pertaining to the intervention (e.g. description of intervention components; intervention setting or timing; implementation fidelity). Six articles focused on programs that were conceived of or delivered primarily through mechanisms under the control of the researcher ($n = 6$), such as demonstration projects (e.g. school-based physical activity or nutrition strategies; community gardening programming). Nine (9) of the reports evaluated more structural-level interventions focusing on resource distribution approaches (e.g. coordinated market economies vs. liberal market economies; exposure to health insurance).

Population(s) of interest and study design

Twelve studies were conducted in the US, with two other studies conducted with populations in the UK. Seven studies were conducted in Europe (Spain, France, Slovenia), while four others were conducted in one of the following countries: Haiti, Thailand, Burkina Faso, and Israel. Four reports described international comparative studies (e.g. Germany vs. United States; Canada vs. United States). Twelve were conducted with adult populations only, while three reported on studies conducted with children only and four focused on studies conducted with adolescent populations only (two studies reported on all



Table 1. Characteristics of the articles captured in the review.

Citation	Population(s)	Country	Design	Intervention(s)	Primary health outcome(s)
Bonsergent et al. (2013)	Adolescents	France	Clinical Trial	Overweight and obesity prevention strategies: education; environment; and screening and care	BMI; BMI z-score and prevalence of overweight/obesity were considered as secondary outcomes Pap test and mammogram
Buhr et al. (2013)	Adults (women only)	USA and Canada	Natural experiment (international comparison)	Health care systems	
Chen et al. (2012)	Children, adolescents and adults	USA	Natural experiment	Installation of bike lanes	Crashes involving pedestrians, cyclists or vehicles
Cochrane et al. (2012)	Adults	England	Randomized trial	NHS Health Check and NHS Health Check, plus lifestyle counselling	Blood pressure, cholesterol, smoking and obesity
Coulon, Wilson, and Egan (2013)	Adults	USA	Randomized trial	Positive Action for Today's Health (PATH)	BMI, blood pressure, waist circumference
Fedewa et al. (2012)	Adults (women only)	USA	Natural experiment	No insurance; Medicaid; private insurance	Cancer stage of diagnosis (or pathological stage)
Hagaman et al. (2013)	Adolescents	France	Ethnography	Regulation of pesticide used in self-poisonings; bus tickets to travel to seek counselling and care outside home community	Attempted and completed suicides
Jordan et al. (2012)	Children, adolescents and adults	Thailand	Natural experiment	Rapid expansion of socioeconomic development programs	Birth size; adult height
Kan et al. (2012)	Adolescents	USA	Quasi-experimental	Enhanced services on health, education and child care vs. usual care of 10 core services	Repeat pregnancy
Lin et al. (2012)	Adults	119 Less Developed Countries	Natural experiment (international comparison)	Economic conditions; educational environment; nutritional status; political regime	Life expectancy at birth
Martin et al. (2012)	Adults	USA	Natural experiment	Various programs, including food stamps and Women, Infants and Children (WIC) nutritional program participation	Overweight, obesity, weight gain
McLeod et al. (2012)	Adults	USA and Germany	Natural experiment (international comparison)	Coordinated market economy vs. Liberal market economy	Mortality and self-rated health
McLeod et al. (2012)	Adults	USA and Germany	Natural experiment (international comparison)	Coordinated market economy vs. Liberal market economy	Mortality
Riddle, Haddad, and Heilmüller (2013)	Children	Burkina Faso	Interrupted time series experiment	Exempting children <5 years of age from health-care user fees	Health centre utilization
Sanchez-Vaznaugh et al. (2012)	Children	USA	Natural experiment	School-district compliance with state physical education policies	Children's physical fitness

Table 1. (Continued).

Citation	Population(s)	Country	Design	Intervention(s)	Primary health outcome(s)
Schiff et al. (2012)	Adolescents	Israel	Natural experiment	War events	Psychological distress
Starc et al. (2012)	Children	Slovenia	Quasi-experiment	Physical education lessons delivered by specialist PE teachers vs. those lessons delivered by generalist teachers	BMI, motor abilities, strength, running speed, flexibility
Ullmann, Goldman, and Pebley (2013)	Adults	USA	Natural experiment	Assimilation into American neighborhoods	Weight change
Witvliet, Kunst, Stronks, and Arah (2012)	Adults	46 countries	Natural experiment (international comparison)	Types of welfare regimes, including social democratic regime (e.g. Scandinavia), conservative regime (e.g. Northern, Western and Southern Europe) and the liberal regime (English-speaking countries)	Self-reported disability
Xu et al. (2013)	Adults	Spain	Natural experiment	Heat wave exposure	Mortality
Zick, Smith, Kowaleski-Jones, Uno, and Merrill (2013)	Adults	USA	Quasi-experiment	Community gardening participation	Overweight and BMI

Table 2. Treatment of context within the article set.

Article	Differential effects evaluated	Resource distribution approach	Context × Intervention acknowledged	Hypothesized mechanisms for context × Intervention	Adjusting or controlling for context or equating context with setting
Bonsergent et al. (2013)	No	No	Yes	No	No
Buhr (2013)	Yes	Yes	No	No	NA
Chen et al. (2012)	Yes	No	No	NA	NA
Cochrane et al. (2012)	Yes	No	No	NA	NA
Coulon et al. (2013)	No	No	Yes	Yes	Yes
Fedewa et al. (2012)	Yes	Yes	Yes	No	Yes
Hagaman et al. (2013)	No	No	Yes	Yes	No
Jordan et al. (2012)	Yes	Yes	No	No	No
Kan et al. (2012)	No	Yes	No	No	No
Lin et al. (2012)	Yes	No	Yes	Yes	No
Martin and Lippert (2012)	Yes	Yes	Yes	Yes	No
McLeod et al (2012a)	Yes	Yes	Yes	Yes	No
McLeod et al (2012b)	Yes	Yes	Yes	Yes	No
Ridde et al. (2013)	Yes	Yes	Yes	Yes	No
Sanchez-Vaznaugh et al. (2012)	No	No	No	NA	NA
Schiff et al. (2012)	Yes	No	Yes	Yes	No
Starc and Strel (2012)	No	No	No	NA	NA
Ullmann et al. (2013)	Yes	No	Yes	Yes	No
Witvliet et al. (2012)	Yes	Yes	Yes	No	No
Xu et al. (2013)	Yes	No	Yes	Yes	Yes
Zick et al. (2013)	Yes	No	Yes	No	No

ages). Two studies (Buhr, 2013; Fedewa et al., 2012) included only women. Three studies adopted quasi-experimental designs; there were three randomized trials included in the sample of reports and 12 'natural experiments' (i.e. an opportunity to study the effects of interventions that researchers have no control over in terms of design or implementation – Petticrew et al., 2005).

Descriptions of context

Across all articles, the operationalization of context was vague, frequently defaulting to the use of broad categories of context (e.g. sociopolitical context; community context; local context). Of the included 21 articles, 14 included at least a brief reference to context or a description that indicated that they conceived of some degree of synergy between intervention and context, albeit to varying degrees of extensiveness (please see Table 2 for a summary of the treatment of context within each article). In these articles, there were clear trends in the ways that context was dealt with, either being treated as 'physical setting' or something that could be 'controlled for'.

Context as physical features rather than socio-relational

Ten of the articles defined and operationalized what they meant by context, mostly focusing on setting features (e.g. descriptions of physical environments such as 'schools' or neighbourhoods) or compositional features (such as 'community assets or deficits', including educational attainment amongst the target population). Overall, descriptions of context were perfunctory (e.g. the intervention was 'performed in a high school context' – Bonsergent et al., 2013, p. 35) and did not specify which features of the context were relevant to the intervention or were most significant within a given context. Some publications mentioned that results should be interpreted within a particular 'country context' (e.g. the Israeli context – Schiff et al., 2012), while others indirectly referred to contexts that were 'supportive of change' as compared to those contexts where the 'status quo' was perceived to be perpetuated. Still others noted that 'local' context was accounted for in their study, without operationalizing 'local context' or indicating how it was accounted for in their research (or in the intervention approach itself).

'Controlling' for context

Three articles included descriptions of how the authors 'adjusted' their analyses for what they generally referred to as 'setting' factors. For example, socioeconomic status of people living in an area was frequently implied to reflect context. 'Setting factors' – the presence or absence of physical features such as park space in urban environments or air conditioners in houses (for example) – were also presented as means to address context. Some sophisticated measures of 'environmental setting factors' were presented, particularly with regards to assessments of how physical space usage might be operationalized (e.g. daytime population density; retail density). However, the inclusion of a list of physical or environmental setting features was usually not accompanied by a more detailed explanation providing insights into other features of 'context' (e.g. social norms); nor was there much description of the dialectical interplay of potential 'Context × Intervention' interactions (e.g. how norms pertaining to power relations between car drivers and cyclists in a particular urban context intersect with interventions that affect the physical features of a city, such as the installation of bike lanes or stop signs).

There were exceptions to the 'light' approach taken to describing context in these studies. For example, Lin, Chen, Chien, and Chan (2012), whose explanation of the intervention (a set of resource distribution approaches) and its effects explicitly describes how context (i.e. political and social arrangements) is tied up in the intervention. They highlight what they view as synergistic effects on life expectancy of the interactive effects of the: (a) economy, measured by gross domestic product per capita at purchasing power parity; (b) educational environment, measured by the literacy rate of the adult population aged 15 years and over; (c) nutritional status, measured by the proportion of undernourished people in the population; and (d) political regime, measured by the regime score from the Polity IV database. In another example, Hagaman et al. (2013) provide a rich description of intervention approaches to prevent suicide in Haiti. The article provides an extensive description of various aspects of context (e.g. social, political, religious, geographic) and carefully links each aspect to both the formulation of the intervention and their explanation of its effectiveness at the overall population level as well as within particular population subgroups. Their characterization of context offers insight into how to interpret representations of suicide prevalence in Haiti, providing a refreshing glimpse into the power of robust treatments of context that includes detailed descriptions of contextual features, such as social histories, social hierarchies, power relations, and social mores and norms. Drawing on a theoretical orientation which systematically privileges models that incorporate context (e.g. locally generated conceptualizations of the self, emotion, personality, and bodily processes), Hagaman et al. (2013) suggest that context may be the key to unpacking the suicide question in Haiti, including the unintentional, harmful effects of some interventions. Ironically, Hagaman et al.'s (2013) careful description and presentation of context is captured under the subheading 'Setting' (rather than 'Context') in the article in the journal where it was published (note: *Social Science & Medicine* uses the term 'setting' in its instructions to authors).

Fidelity

Two articles directly addressed the issue of intervention fidelity (Sanchez-Vaznaugh, Sanchez, Rosas, Baek, & Egerter, 2012; Starc & Strel, 2012). One study (Starc & Strel, 2012) of a physical education curriculum intervention in Slovenia argued that specialist physical education teachers were more likely and capable of sticking to the program than non-specialists – 'failure' to have the professional capacity or professional training to implement the intervention with sufficient fidelity was linked with failure to enhance physical activity and reduce obesity outcomes in students. A different study in California (Sanchez-Vaznaugh et al., 2012) demonstrated that school district-level compliance with physical education policies was associated with improvements in physical fitness among 5th-grade public school students (i.e. the higher the degree of intervention fidelity, the greater the effect size). Eleven other articles referred briefly to context and its potential implication for intervention fidelity. While contextual features were not operationalized in any of these 11 articles, their discussion sections referred indirectly to contextual features (e.g. gender; culture) that *might* have affected the intervention outcomes. In this sample of articles, discussions of context were used to help explain intervention 'failure'. Intervention

adaptation, scalability, or replication was not discussed in the articles. Rather, context was most frequently portrayed as something (unmeasured and therefore unknown) that interfered with the chances of detecting the intended impacts of an intervention – or the fidelity with which the intervention had been implemented.

Discussion

All included articles described the intervention at least briefly, but only a few examples described context in robust and dynamic ways, like those suggested in Hawe (2009). In lieu of more precise uses of the term context (Courtright, 2007), there was a tendency to stop at identifying the setting in which the intervention is conducted (e.g. low-income area, schools). This set of empirical articles tended to stop short of describing context in great detail, beyond indicating the country or city where an intervention occurred. Some used the socio-demographic profiles of the target population (e.g. African-Americans, early-age mothers) as proxy markers for context. Most of the descriptions of context did not include descriptions of people's social connectedness to others (e.g. various forms of social capital) or their affinity towards the institutions affiliated with the interventions (e.g. trust in government). Research has shown that *perceptions* of context have significant effects on health behaviour – and that those *perceptions* of context are themselves embedded in social norms (Moore et al., 2014). Context also has been shown to have important effects on the ways in which decision-makers view evidence about which interventions are worth (continuing) investing in (Lorenc et al., 2014). These more social features of context need to be accounted for because they are important to understanding intervention outcomes (Deering et al., 2011; Hawe, 2010; Shoveller, Johnson, Langille, & Mitchell, 2004).

Overall, the articles used post hoc 'adjustments' to explain away what were theorized to be the confounding impacts of *socio-environmental setting* factors (e.g. socioeconomic characteristics of a neighbourhood). Thirteen studies alluded to the potential for interactions between intervention and context, but did so without specificity, treating context as if it was a 'catch-all' category of unmeasured confounders. Frequently, context was treated as a set of barriers that prevented people from accessing the 'right' dose of intervention – two articles directly addressed 'fidelity' and context, but essentially used factors thought to exist within the context to explain insufficiently strong fidelity and linked that to intervention failure. As others have suggested (e.g. Craig et al., 2008), a fulsome understanding of intervention fidelity can reveal a great deal about both the intended and 'real-world' (i.e. contextualized) effects of the intervention (Bonell, Fletcher, Morton, Lorenc, & Moore, 2012; Hawe, 2004).

Casting context as something that needs to be 'controlled for' misses opportunities to characterize the dialectical relationship between context, intervention and outcomes (Glasgow & Chambers, 2012). As McCuaig and Hay (2014) recently noted, 'knowledge recontextualisation' may encompass an approach to the 'notion of fidelity that more appropriately accounts for the dynamics and expectations' that are produced at the confluence of implementation and context that feature in the everyday lives of most people (e.g. neighbourhood context, occupational context, family context) (Chum & O'Campo, 2013). By thoroughly documenting the dialectical links between social *and* physical aspects of contexts, we can generate important evidence to inform decisions about intervention investments that are well suited within and across contexts (Shepperd et al., 2009).

It remains an open question as to how we should measure salient features of context. However, the value of 'harnessing the understanding of context [... and its capacity to ...] enable beneficial adaptation of the intervention and improve sustainability' is becoming widely accepted (Chambers, Glasgow, & Stange, 2013). To be clear, we are not suggesting that there is utility in compiling 'laundry lists'¹ of contextual features (i.e. what 'counts' as context) and what does not. Nor are we suggesting that a singular focus on improved technical (e.g. measurement) capacity in this area will suffice. Instead, we suggest that it will be important to *strategically* promote research that concomitantly focuses on the roles/import of theoretically relevant contextual features and how they might substantially alter the implementation, adaptation, or potential impacts of interventions. Here, it may be informative to pay attention to work that explicates 'gene × environment' interactions (e.g. see examples provided in Xie

et al. (2010) or Nikulina, Widom, & Brzustowicz (2012)). Interdisciplinary collaborations (e.g. amongst social, biological, and population health scientists) could be particularly useful in identifying the health impacts of combinations of biology (e.g. sex-based characteristics) and exposures to *social* phenomena across contexts (e.g. racism and sexism) (El-Sayed, Koenen, & Galea, 2013).

Conclusions and recommendations for future directions

The current paper uses conceptual understandings of context (as discussed by Edwards and Di Ruggiero (2011), Poland, Frohlich, and Cargo (2008) and Frohlich, Corin, and Potvin (2001)) to investigate how recent empirical literature ‘treats’ context. While readers might (dis)agree with the boundaries set on the initial search, the current ‘snapshot’ reveals both strengths and limitations of empirical descriptions of context (associated with health outcomes of interventions) that have been published recently in the public health realm. Much has already been written about context and why it matters, and our analysis offers some analysis of the need for (and potential benefits of) empirically integrating context into primary studies of population health interventions. While this is not yet a widely occurring phenomenon, we also suggest that there soon may be benefit in using more extensive and systematic scoping and synthesis (or other review) methods to further assess the breadth and depth of the empirical treatment of context with the peer-reviewed and grey literatures (Arksey & O’Malley, 2005; Gough, Thomas, & Oliver, 2012; Levac, Colquhoun, & O’Brien, 2010). This would provide a means to assess the full extent of the knowledge foundation and gaps in this area, given that the state of the published, peer-review literature appears to be somewhat nascent and potentially skewed towards particular methods (e.g. quantitative) or disciplines (e.g. epidemiology, psychology).

Nearly 10 years ago, McLaren, Ghali, Lorenzetti, and Rock (2007) pointed out that context was inadequately characterized in many population health interventions and our study suggests that little has changed in the intervening decade. Based on the current review, it appears that the field of PHIR could immediately benefit from a more systematic and serious treatment of context as it pertains to intervention research (Dorling, White, Turner, Campbell, & Lamont, 2014; Luoto, Shekelle, Maglione, Johnsen, & Perry, 2014). We strongly encourage new theoretical and methodological work that takes up the challenges of fulsomely studying context at multiple levels, rather than merely ‘controlling’ for it, as is ‘the typical modus operandi’ (Richard, Gauvin, & Raine, 2011, p. 319) in the public health research agenda. Some fundamental (re)theorizing of the context x intervention relationship could help here. Taking up context as ‘anything external to the intervention that may act as a barrier or facilitator to its implementation, or its effects’ (Moore et al., 2015, p. 1) and implies a stability to both context and intervention (and as some might suggest, to health behaviour itself; Cohn, 2014) that might be overly contrived and limiting (Cohn, Clinch, Bunn, & Stronge, 2013).

Indeed, the paradigm of evidence-based medicine, which views RCTs as the ‘gold standard’ of medical knowledge, continues to contribute to the neglect of context within population health sciences. False and unhelpful separations between ‘evidence’ and real-world effectiveness (i.e. context-informed approaches) have been called into question (Moreira, 2007), particularly by those influenced by complex systems thinking (Hawe, 2015). We agree that without more sophisticated treatments of context, there is a risk that the interventions for which we have the ‘best evidence’ will continue to be those that can be evaluated using ‘gold standard’ methods (and vice versa) that do not have the capacity to fulsomely measure context. As de Leeuw (2011) describes, most researchers evaluating the effects of interventions, especially those that are multi-level and complex, default to a deeply engrained ‘reflex to cut up phenomena under study into disjointed elements, thus disabling them to see and interpret the whole’ (p. 220). We agree this is a barrier for making important population health gains and, like others interested in context and in contextualizing the effectiveness (or lack thereof) of interventions on population health (Shareck, Frohlich, & Poland, 2013), we view critical realist perspectives and realist evaluation approaches as key.

Realist approaches offer a chance to challenge the status quo, which seems to characterize context as equaling the sum of compositional, socio-demographic profiles plus environmental characteristics.

In considering what this might entail, we point to Harris, Friel, and Wilson's (2015) realist policy analysis of land-use planning systems in Australia. Several features of their work warrant comment, including their real-time use of multiple methods and incorporation of 15 qualitative cases, and perhaps most innovatively their conceptualization and operationalization of the units of analysis (structures, actors, ideas). While some scholars (e.g. Cohn et al., 2013) have argued that more quantitatively oriented study designs and techniques (e.g. RCTs) are at odds with fulsome treatments of context, we remain less convinced that complexity and context are incompatible to quantitative approaches. Here we point to the potential utility of social network analysis or data simulation which move beyond popular statistical methods (built on conceptualizations that essentialize 'scientific' as a suspension of reality). Instead of 'freezing' contexts *and* interventions (i.e. making the data stand still or imagining situations in which 'all other things are equal'), these approaches offer strategies for being transparent and explicit about contexts and interventions, and their non-linear unfolding in real life.

We acknowledge that several aspects of our own analysis of descriptions of context remain contested. In some of the examples that we elected to include in our review, it may be difficult to parse what constitutes the 'intervention' vs. what constitutes the 'context'. For instance, are a nation's economic structures or other institutional arrangements to be considered as interventions or as context? And we acknowledge that many questions remain to be examined in order to delineate (where useful) what constitutes an intervention study itself as opposed to observational studies (e.g. Lin et al., 2012). We suggest that in observing the social world, there arises an inevitable and often desirable blurring of context and interventions. As Hawe (2015) reminds us: the intervention 'couples and embeds' with context. In the absence of this fundamental view, we are left with what Bell (2012) refers to as the 'eliding of context' – where the illogical (yet wildly dominant) world view would have us believe that 'Interventions retain their efficacy across time and space because culture, meaning and context are irrelevant' (Bell, 2012, p. 318).

More explicit focus on context x intervention also could help shift PHI researchers and others towards concentrating on interventions that address fundamental causes of health and social inequities – and, placing less emphasis on 'downstream' interventions that tend not to account for context x intervention interactions, but that are relatively easy to evidence within conventional paradigms. A focus on the political, cultural, economic, and social contextual features implicated in 'upstream' interventions appears to be gaining traction (McLaren & McIntyre, 2013), including those focused on structural reforms to reduce inequalities via resource redistribution (Frohlich & Potvin, 2008; Lorenc, Petticrew, Welch, & Tugwell, 2013; Shannon et al., 2009). For example, recently proposed interventions intended to renew Europe's economy suggest that the most promising strategies are those that are context dependent (Enderlein & Pisani-Ferry, 2014). And, as revealed through examinations of earlier austerity measures across Europe (e.g. Stuckler & Basu, 2013), the impacts of such structural-level interventions are often variegated across cultural, political, and geographic contexts. As other promising examples (e.g. Kneipp, Kairalla, & Sheely, 2013; Roy, McHugh, & Hill O'Connor, 2014; WISE Project, 2013) indicate, studying context can provide powerful insights regarding promising structural interventions to fundamentally address a range of pressing public health issues (e.g. migration).

Accepting the notion that 'Intervention = Intervention x Context' demands a new set of approaches to theory, methods, and reporting of research results of interventions within journals and elsewhere. Therefore, the fulsome pursuit of understanding context within population and public health sciences will inevitably require interdisciplinary team science approaches. This will require authentic interdisciplinary engagement, particularly with social scientists (e.g. sociologists, anthropologists), who are too often only invited to focus on the processes of implementation. A social science informed view necessarily calls into question mainstream conceptualizations of 'gold standard evidence' (i.e. the context-less RCT) and questions assumptions that data from across places and times can be combined to arrive at a transposable intervention and effect size (e.g. via meta-analyses). As well, social science approaches explicitly forefront a dialectical understanding of the production and evolution of contexts and interventions. This can be viewed in contrast with conventional public health traditions that tend

to privilege the physical over the social – and fail to acknowledge a large body of social science theory that accounts for the co-production of both contexts and interventions.

Drawing on lessons from others who have enabled shifts in funding and reporting practices (Edwards & Di Ruggiero, 2011; Hawe, Samis, Di Ruggiero, & Shoveller, 2011; Johnson, Sharman, Vissandjée, & Stewart, 2014), we suggest that it is feasible to build new and better science that accounts for context. And we endorse new and coordinated research funding, publishing and training efforts to build the capacity required to treat context as integral to the intervention (e.g. incentivize interdisciplinary collaborations; adoption of publishing standards; update curricula to reflect relevant conceptual and methodological advances). Specifically, we commend those publishers who adopt progressive approaches to relaxing or revising standards for word-limits in order to accommodate fulsome descriptions of context, or those who strategically use supplemental files (or companion articles published elsewhere) to provide readers with access to additional data that matter to the interpretation of otherwise de-contextualized effect measures. Without this more explicit focus on context within public health intervention work, there is a real risk of potentially misattributing effects (positive, negative, or non-existent) of interventions, or context, or both. Too much is at stake in terms of ongoing and emerging policy and program investments to continue along that vein.

Note

1. We first began to think seriously about the futility of producing 'laundry lists' of contextual features while reading a column by Dani Rodrik, which commented on the 2008 report from 'The Spence Commission on Growth and Development'. His critique obviously was not launched at context and PHIR per se, but it continues to resonate strongly with us. To read Dani Rodrik's comment, see: <http://www.theguardian.com/commentisfree/2008/jul/10/economics.development>.

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