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The Health Significance of Families Seen through the Recent Measles Outbreak

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Abstract

The recent rise of measles demonstrates the importance of our families' social characteristics for a host of infectious and non-infectious diseases. We need to recognize that families are more than their shared genes; families are distinctive health environments and our family relationships affect our health and health behaviors. Although families are a relatively understudied health context, I recommend several avenues by which we can grow this exciting field within social epidemiology. With a greater understanding of how families' social characteristics influence health, we can inform clinical and public health practices and better meet our public health goals.

Keywords: Families; Measles; Social epidemiology; Vaccination

Introduction

Earlier this year, at least 95 measles cases were linked to Disneyland, the fabled family destination [1]. In this commentary, I leverage the recent rise of U.S. measles cases to illuminate the ways in which families' social traits matter for individual and public health. I conclude with suggestions for increasing scholarship in this exciting field within social epidemiology.

Current medical care and research tends to focus on individual risk and protective factors, often overlooking how family ties and experiences influence health. Even when we implicitly realize that families influence health, our conceptual models and data structures often reduce families to individual traits and, thus, obscure their importance. This is exemplified in measles patients' medical charts. Of the 159 documented measles cases presenting during the first half of 2013 in the U.S., 63% were children and 81% were unvaccinated [2]. Five percent of the unvaccinated, pediatric patients missed their vaccination opportunities; 13% were too young for vaccination; and 79% had philosophical objections [2]. Yet it is important to recognize who had the philosophical objections and missed the vaccination opportunities: it was the parents, not the children. This expedient recording of the parents' behavior as a trait of the patient erases the family unit entirely, masking the ways in which familial ties influence health.

Families can heighten individuals' risks of contracting measles. Measles clusters within families given the intimacy of family life [3]; an infected person's family member has a significantly greater risk of infection than random individuals. Family behaviors also create unequal health risks, as demonstrated with the Disneyland outbreak. Millions of families with young children flock to Disneyland every year. Even if only 2% of these families have not vaccinated their children, this translates into thousands of susceptible children coming in contact with each other. Together, families' vaccination decisions and vacation plans created heightened risks for some children, but not others.

The "anti-vaccination" movement also demonstrates that familial social processes affect public health. First, by reducing herd immunity, anti-vaccination parents create risks for children who are ineligible or immunologically unable to be vaccinated [4]. Second, public health campaigns can reduce the risks for multiple children by targeting critical family members typically mothers [5] who make health-related decisions for the whole family. In sum, the recent measles outbreak reveals the significance of families for individual and public health. Yet this is only the tip of the iceberg.

Beyond measles

Numerous infectious and non-infectious diseases cluster within families. Health researchers have long recognized families' role in curbing or accelerating the transmission of infectious diseases [6], but many health researchers attribute the family clustering of non-infectious diseases to genetic heritability [7,8]. Thinking of families as small gene pools, families' social characteristics are underplayed. Health researchers studying individual risk factors eliminate this family clustering by either collecting data from only one person per family in population-based, case-control designs [9] or by using statistical techniques to account for – but not investigate – this clustering in family-based designs [10]. Both approaches bypass families' shared social characteristics.

Yet families are more than their genes and we should examine their social traits. Families create a unique health environment within which people develop and age, eat and sleep, learn and practice health behaviors, and receive therapeutic care. Further, families provide sustained intimate relationships, structure daily life, and connect members to outside organizations. It is somewhat surprising that families have been relatively under-studied as an important health context, especially relative to neighborhoods [11,12], given that families are considerably more modifiable and come in direct contact with the health care system.

A key stumbling block for creating a family-focused research agenda is that families' structural traits, meaning their shared social characteristics, are typically labeled as individual traits. For example, marital status, parenthood, and socioeconomic status are often viewed as personal attributes, but they are family characteristics. It takes (at

least) two people to get married and birth or adopt children and couples coordinate their employment decisions [13]. Individual action creates and reinforces the family, but once created, families are more than the sum of their parts [14] and become important health contexts unto their own.

There are two broad dimensions of family life that matter for individual health – the family's interpersonal processes and their structural traits. I next describe each dimension and demonstrate their importance for children's risks for contracting measles.

Family interpersonal processes

Through the content and patterning of their communication and behavior, family members can influence each other's health. This dimension comprises families' dynamic relationships, though it is often captured with measures from a single point in time. It includes adults' joint decision-making, caregiving relationships, and children's socialization. Hierarchies within the family govern these interactions, such that each family member does not have equal authority and influence. Over time, repeated patterns and communication styles create an emotional climate [15], which affects individuals' physical and psychological health [16,17].

Family interpersonal processes can directly alter biological states or indirectly affect health by influencing individuals' behavior. Direct effects can occur, for example, in abusive situations [18–20] or when family conversations produce a hyper-reactive stress response [21]. Yet most health effects are indirect, such as when parents safeguard their children's long-term health by teaching them to wash their hands. In fact, the avenues of indirect family influence are numerous: family members help establish our health-related identities and norms [22,23], transmit health-related information and resources [24–26], care for us through illness and other difficulties [27], and serve as healthcare consultants [28].

Returning to the measles example, we can see how family interpersonal processes matter. First, it is clear that anti-vaccination parents' authority creates children's vulnerabilities. Second, parents' vaccination decisions are influenced by the information and perspectives of their family members [29].

Family structural characteristics

Family structural traits include the family's religion, race, social class, residential location, the quality of communal meals, and shared routines. This is family as context; it constrains and enables members' health-related behaviors. Like other institutions, families have various capacities and subsystems that can change over time [30].

Two fundamental structural features are families' resources and composition. Family resources include their economic wealth, social connections, literacy and shared information, and political power [31]. These resources derive from and intersect with the family's race, ethnicity and immigration history [31]. To prevent and combat an array of diseases and health risks, families can leverage their resources [32], but this also exacerbates health disparities given resource inequalities across families. Family composition encompasses the size, age structure, sex composition, and biological, legal, and social ties linking members. These traits create different health environments due to societal expectations for people of different ages, genders, and relationships [33,34]. In the future, families' structural traits will likely prove critical for emergent health disparities because family resources and compositions are increasingly unequal [35,36].

Familial structural traits are implicated in children's measles risks. High-income, anti-vaccination parents can evade public school vaccination requirements by enrolling their children in private school [37]. Yet, limited resources can also play a role. One mother described how her limited healthcare coverage and slow internet connection meant she could only find vaccination horror stories, not accurate information [38].

Recommendations

To advance our understanding of how family social processes matter for health, we can take several steps. First, with greater interest and awareness, we can increase the interdisciplinary pool of scholars thinking critically about how family relationships and structural traits influence specific health outcomes. Together, we can consider how these familial processes and resources intersect with genetic, biological, developmental, and behavioral processes. Several remarkable scholars have laid the theoretical foundation [20–22,27,39], but there is fertile ground for more work to be done, especially for developing hypotheses about how the these family social characteristics "get under the skin."

Second, we can collect more data about family's social characteristics in bio-medical and epidemiological studies using existing survey tools. For example, the "15-minute (or less) Family Interview" [40] is useful for data collected in clinical settings. Epidemiological surveys can utilize standard Census [41] items to query respondents about key family members' education, age, gender, and employment. To inquire about respondents' family relationships, daily stressors, parenting practices, and work and family experiences, researchers can use survey items from the National Survey of Midlife Development in the U.S. (MIDUS) [42]. Lastly, the Health and Retirement Study has high-quality survey items about individuals' own and their family members' caregiving roles [43].

Further, it would be a tremendous asset if the infrastructure of large-scale epidemiological studies, like NHANES or NHIS in the U.S., could be re-tooled to allow researchers to utilize the household roster data collected in their screening process. Field representatives for NHANES and NHIS collect demographic and relationship information for every household member to determine whether specific individuals are eligible for participation in the study. If these household data were systematized and made available, researchers with approved access could create indicators for whether a study member's mother, father, grandparent and/or siblings are in the home and then merge that information to the individual data. Going one step further, if we could link individual survey respondents who live in the same household and know how they are related, particularly when neither is the household head, we could build unique family data sets with detailed health measures.

By expanding the family information collected in bio-medical and epidemiological studies, we can better test whether and how families' social traits matter for health. The risk, however, is that our theoretical and empirical knowledge will remain stunted if family traits are simply appended to individual data. Specifically, we run the risk of committing an "atomistic" or "individualistic" fallacy, which occurs when group-level causal processes are investigated at the individual level [44]. It is the converse of an "ecological fallacy," yet leads to the same empirical risk: we may arrive at incorrect conclusions because individual-level estimates may differ from group-level (i.e., family-

level) estimates [44]. If we only utilize data with individuals as the unit of analysis, we will misconstrue the role of families for health.

To focus on families as the unit of analysis, we could exploit existing social science datasets with multiple family members nested within families, like the Panel Study of Income Dynamics [45] or the Fragile Families and Child Well-Being Study [46]. While these data have rich, longitudinal information about the family's composition and members' characteristics, the challenge is that these data sets have fewer health measures and a limited capacity to uncover the mechanisms by which family social traits lead to various health conditions.

Lastly, we could develop studies with detailed health measures and high-quality social indicators about multiple family members and their shared family traits. To create such an ideal study, we can borrow from various data collection and analysis tools depending on our theoretical model. For example, if we suspect that contagion processes are at work within the family, then we could collect social network data with a focus on family relationships and utilize appropriate network modeling techniques. Alternatively, we could directly query several family members about their health beliefs, health behaviors, and the quality of their family relationships. If scholars collect paired data (e.g., from couples), then they could utilize dyadic data analysis techniques [47]. With two or more family members, researchers can use hierarchical linear modeling [48], or structural equation modeling techniques [49], and even account for family members' genetic resemblance [50]. If biological specimens and laboratory measurements were also collected, then the research possibilities abound. Interdisciplinary, collaborative teams, like the Work, Family & Health Network, could identify the requisite survey questions and critical laboratory and examination procedures needed for a thorough study of particular health outcomes.

By expanding the amount and kinds of family data we collect, we can explore new research questions and new avenues by which we can improve health. Family members can affect individual and population health because of who they are and what they do. With a greater recognition that "illness is a family affair" [23], we can provide better medical care and advance public health.

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