The process of crafting bicycle and pedestrian policy: A discussion of cost–benefit analysis and the multiple streams framework

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A R T I C L E   I N F O

A B S T R A C T

Existing literature on bicycling policies and infrastructure in the United States is still somewhat limited in number and scope, with the majority of research framed by a cost–benefit analysis (CBA) framework of decision making; this has led studies to focus on the potential benefits of bicycle and pedestrian facilities, factors affecting the use of bicycles as a mode of transit, and the improvement of CBA analysis with regards to bike/ped programs. While the CBA framework may be accurately matched to the practical process of specific policy implementation for some governing organizations, and provide valid evidence for application under other frameworks, it does not account for the role of policy windows and policy entrepreneurs in policy decision making, or for the role of effective advocacy. After a review of the existing literature, I suggest the multiple streams framework as a more suitable framework for understanding decision making with regard to non-motorized transportation policies, and provides a useful structure for future research (particularly on the role of advocacy groups and policy entrepreneurs in the planning and policy process).

1. Introduction

Transportation decision-making is primarily conducted through the lens of the rational actor model (RAM), which assumes that individual decision-making is a rational (or boundedly rational) process of weighing options and trade-offs to maximize positive outcomes and minimize negative outcomes. This model of behavior has led to an emphasis on framing research in the language of cost–benefit analysis (CBA), an analytical tool that has over time become a sort of epistemological and theoretical framework for transportation research, one especially common in bicycle and pedestrian literature. This narrow focus on rational decision-making and costs/benefits has limited bicycle and pedestrian research from fully considering the range of possible factors at work in bicycling and walking behavior (Schneider, 2013), the implementation of policies and projects, and the conditions needed for policy change. In addition, the RAM suggests that similar levels of adoption of particular policies would occur across agencies and jurisdictions, particularly if the benefit-to-cost ratio is as high as some have demonstrated (Cavill et al., 2008). Yet the level of individual state commitment to bike and pedestrian programs since ISTEA has varied greatly (Cradock et al., 2009). Similarly, MAP-21 has provided MPOs with an expanded role in bicycle and pedestrian programs, but the variation in implementation of such programs across cities reveals that there are factors missing in this model of decision-making. As such, an alternative framework is called for.

The intent of this paper is not to challenge RAM, as has been done well by others (Kane and Del Mistro, 2003; Talvitie, 1997; Willson, 2001). Rather, the goal is to suggest an alternative direction for framing future bicycle and pedestrian research, in the belief that it more closely mirrors the policy process as it actually exists. Pulling from the public policy literature, the multiple streams framework provides a way to alternatively structure existing knowledge on bicycle and pedestrian planning and policy, and by doing so identify significant areas for future exploration and research. Though the multiple streams framework is one of many potentially applicable alternative perspectives, its focus on multiple simultaneous paths generating new arguments and information and then merging together under particular (conducive) circumstances provides an avenue which can make sense of the volume of CBA-framed work, but also incorporate more complex stories about advocacy organizations and critical policy entrepreneurs.

This project reconstructs the existing literature, with the aim of seeing how the research fits into a new overarching framework and what gaps in knowledge that new framework might reveal. While the intent of the paper is to suggest a superior framework for approaching both bicycle and pedestrian research, much of the literature referenced is bicycle-specific. Although there exist many important differences between the two modes, both are currently

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limited by their focus on CBA and would benefit from the consideration of alternative epistemological and conceptual frameworks, and so are grouped together here.

The first step is a brief discussion of the state of the field, and some important critiques of CBA as a guiding research framework, before moving into an alternative framing of the literature. Then, the introduction of the multiple streams framework (MSF), and the incorporation of a suite of the existing literature into what is proposed as the appropriate area of the framework. This re-framing of the issues may lead to some contention, but in the hopes that it will highlight some great opportunities for better understanding.

2. Limitations of CBA

CBA is prominent as an analytical tool in transportation research (Kane and Del Mistro, 2003; Talvitie, 1997; Willson, 2001), but it also frames the nature of what evidence is considered meaningful as a contribution to the field or as evidence for action (Krizek et al., 2007). Implicit within the use of CBA is a neo-positivist assumption about the role of such evidence as well as its validity. This particular epistemological foundation suggests that policy analysts and decision-makers evaluate potential evidence according to the falsifiability of its claims and content, as well as its generalizability across the intended population. By employing this narrow model of decision-making within the policy process, bike/ped scholarship limits its own ability to proffer a range of evidence and to expand its understanding of the role of non-economic factors in the policy process.

In this way, the focus on costs and benefits has led to increased focus on the quantification of complex concepts such as sustainability measures, public health improvements, and sprawl (Hatzopoulou and Miller, 2009; Wang et al., 2004; Saelensminde, 2004; Krizek et al., 2007; Komanoff et al., 1993; Wang, 2011; Johnson, 2001). The rational actor model and CBA focus of the literature is well demonstrated in the suite of research attempting to quantify the benefits of bicycling and walking. It is easy to see why the continued use of CBA is so compelling for the field: Cavill et al., in their extensive review of attempts to quantify the costs and benefits associated with cycling, found that cost–benefit analyses of bike/ped infrastructure generally produce positive ratios (greater benefits than costs), with their meta-analysis finding a median benefit–cost ratio of 5:1 (Cavill et al., 2008). Given the frequency of such work to reveal ratios in favor of bicycling, it should not be surprising that so much effort has been devoted to providing more accurate and specific quantification of benefits. However, there has been little awareness of how such a focus on rational economic arguments has limited the scope and strength of any arguments in favor of bicycling as a policy solution, and limited the range of viable explanations for policy and planning success that are explored. By incorporating CBA as one part of a larger policy process framework it may enable the provision of a wider ranger of evidence and its application to decision-making. CBA does still have a vital place in understanding what weights are given to different issues related to bicycle and pedestrian programs, but it must be employed alongside a policy process framework that can also account for the non-economic and non-quantitative variables that affect policy.

3. Multiple streams framework and underlying epistemology

The multiple streams framework (MSF) is an explanatory framework for the process of policy creation based on the concept of three completely independent streams – problems, policy solutions, and politics – that are coupled together by policy entrepreneurs during short periods of opportunity (termed policy windows by Kingdon (1984)) to implement a policy (Zahariadis, 2007). The multiple streams approach assumes that there is a given level of ambiguity in policy-making, in other words, that there is no inherently more appropriate way of conceiving of an issue or event. This ambiguity is a constant feature of policy-making due to the subjective phenomenology of individual actors (Yanow, 2003). This is a clear contrast to the philosophy of science underlying CBA and the RAM, which assumes a higher degree of objective rationality. Instead, the MSF adopts an epistemological background that emphasizes the role of subjective knowledge.

Having made the case for the incompleteness of CBA for understanding the process of decision-making for bicycle/pedestrian policies, the next step is to use the multiple streams framework (Kingdon, 1984; Zahariadis, 2007) to frame the existing literature, with the hope that doing so will suggest further important factors that CBA did not include (and which might direct future efforts at bicycle and pedestrian policymaking). The first step is to consider the existing research in the terms of the independent streams, and then to consider what components of the framework are broadly missing within bike/ped literature.

3.1. Problems stream

The problems stream is envisioned as a channel composed of all the various issues facing actors at different points. Although the stream itself consists of a likely near-infinite sample of issues, actors will actually confront only select problems. These problems may be identified either through the appearance of an indicator, or by a dramatic change in an existing indicator (Kingdon, 1984). Since numerous institutional actors monitor activities and events (health conditions, economic variables, program outcomes and costs, etc.), an indicator of a problem may be identified at any time in the course of a systematic operation. What determines whether something is an indicator of a problem is highly interpretive, and is generally selected by one or a number of actors involved in the problem stream. Problems may also be identified by changes in existing indicators that suggest problematic potential or were identified as problems previously but were left to be monitored. While some of the negative effects of automobile use did become abruptly prominent in the 1970s, issues of obesity (Johnson, 2002), compounded traffic congestion (Texas Transportation Institute, 2010), commute time (U.S. Census Bureau, 2009), and high cost of transportation (AAA Exchange, 2007, 2010) have all seen relatively gradual increases over time.

This discrepancy between when a problem is noticed and when it reaches primacy may have to do with the aforementioned interpretive quality of problem identification; since indicators rely on value judgments and normative goals as the basis for evaluating a positive condition compared to a negative condition, they are not purely factual and instead highly interpretive. There may be conditions that are favorable for identification of a problem in one interpretive light, but under another fail to do so. As such, the problem identification process is highly contested. Sometimes, however, an event (which Kingdon labels the "Focusing Event") will lead to a high degree of agreement on a problem. This may be a response to crisis, a disaster, an impending threat to something of shared value, or a symbol that comes to represent a more widespread issue. Such events may also simply be due to a shift in priorities resulting from a change in a hierarchical order, for example the appointment of a new committee chair, DOT Commissioner, or Secretary of Transportation.

In the case of the problem stream potentially associated with bicycling as a solution, there are numerous issues represented: obesity and cardiac illness, pollution emissions and fuel

consumption, traffic congestion and high cost of living, etc. Obesity rates may have stabilized in the United States, but with 30% of American adults qualified as obese (Rokholm et al., 2010). Finkelstein et al. (2010) estimate the total cost of obesity-related medical care at $147 billion. Growing awareness of the role that the design of the physical environment plays in obesity has led planners and public health professionals to reach joint policy suggestions to reduce obesity and support cardiac health (Wakefield, 2004; Dill, 2009). Another prominent issue is the quantity of emissions and gasoline involved in automobile use. As of 2000, passenger vehicles accounted for an average of 14,000 pounds worth of carbon dioxide emissions and 600 gallons of gasoline consumed per vehicle annually (Office of Transportation and Air Quality, 2000). Total carbon dioxide emissions from passenger vehicles were over 1.8 trillion pounds (Bureau of Transportation Statistics, 2008). Traffic congestion does not help; the Texas Transportation Institute estimates that around 2.8 billion gallons of fuel were wasted in traffic in 2007. In addition, drivers endured an average of 36 h of traffic delays a year (Texas Transportation Institute, 2010). The high cost of automobile operation and ownership is another issue contained within the problem stream. The primary determinant of auto ownership is income (Pucher and Renne, 2003); considering that the average annual cost of automobile ownership in 2010 was $5,976, this is not surprising (AAA Exchange, 2010). This particularly hinders low-income families and ethnic minorities (Pucher and Renne, 2003).

In the same way that problems may be identified and not put in a position of prominence, they may also be in a position of prominence but fall by the wayside as solutions have failed to resolve them. Agencies, organizations, or legislators may grow weary of political pressure and crate an issue, or public enthusiasm might wane in the face of adversity (Kingdon, 1984). Framing and categorization also play an important part in the process of a problem gaining prominence. In addition, the framing of problems can also have an impact on alliances within the problem stream. In the case of cycling, the incorporation of public health concerns has been instrumental in making cycling more visible and more valuable (Pucher and Dijkstra, 2003). Joint efforts between proponents of non-motorized transportation policies, public health officials, education professionals, and environmental organizations have found success by banding together (Geraghty et al., 2009).

3.2. Policy solutions stream

The policy solutions stream is comprised of the range of different policy options available to solve problems (though again, the problem and solution are not attached yet, as any number of solutions and problems could potentially partner with each other, given the right circumstances). Bicycling and walking might be viewed as one of a myriad of different solutions in the policy stream (alongside electrical vehicles, transit, or carpooling for example), with more specific policies (perhaps high-quality separated use facilities) also included. Much of the bicycle and pedestrian literature could be characterized as work that belongs in the policy solutions stream. A large amount of recent literature has focused on one or more of the specific benefits provided by cycling or walking as a mode of transportation. This may take the form of specific discussions of environmental benefits (Komanoff et al., 1993; Saelensminde, 2004), reduced traffic congestion, reductions in illness and associated absences, parking costs, and the aforementioned reductions in environmental impacts. A particularly popular topic of research is the public health benefits of cycling (Unwin, 1995; Wakefield, 2004; Pucher and Dijkstra, 2003; Finkelstein et al., 2010; de Hartog et al., 2010). This research on the ability of bicycling

and walking to generate specific problem-specific outcomes ties in directly to two of the most prominent areas of the literature: implementation and mode choice.

The large differences in bicycle and pedestrian mode share have spurred a great deal of research on the factors that affect the decision to ride or to walk. Most are focused on the role of specific facilities (Pikora et al., 2006), but a few consider additional factors such as health benefits (Unwin, 1995; Pucher and Dijkstra, 2003), comfort (Xing et al., 2010), destinations (Cao et al., 2006), and safety (Pucher and Dijkstra, 2003; Jacobsen, 2009; Akar and Clifton, 2009). Recently, efforts have been made to generate a more comprehensive model of mode choice decisions for bicycling and walking (Schneider, 2013). The sum result of this work has been some mixed guidance. Among those concerned with what facilities are most preferred by cyclists, many found that dedicated bike lanes were most valuable (Tilahun et al., 2007; Hunt and Abraham, 2007; Akar and Clifton, 2009; Tin et al., 2010; Cervero et al., 2009). In contrast, Titze et al. (2010) found that access to bike and walking *paths* are more important, while Dill (2009) notes that specific facilities are no replacement for integrated networks. This mode choice literature explores the applicability of particular sub-strategies (paths, sidewalks, lanes, shared markings) for making a broader policy solution (bicycling/walking) a viable candidate within the solution stream, and serves an important role in better equipping actors within the solution stream with the knowledge needed to be effective in cases where the solution is selected for implementation. These mixed findings on the importance of infrastructure highlight the importance of building upon comprehensive models such as Schneider's (2013), which consider a broader range of factors at play in individual-level modal decisions.

Although the existing literature appears to fit neatly into MSF, there are some points made in the MSF literature that may draw attention to areas for additional research. The policy stream is comprised of a variety of actors who are specialists in their particular fields (fields which are connected to an area of policy); due to this specialization and the size of the policy fields, they often engender interaction between members. The nature of this interaction might be broad, with members interacting across sub-specializations, or it might be highly fragmented. In the case of fragmented policy areas, a larger topic might be divided into different pieces with dissimilar or even competing interests. In the case of bicycle and pedestrian policy, it falls under the very large umbrella of transportation, which might be further fragmented into rail, bus, automobile, aviation, non-motorized, and shipping.

This fragmentation means that despite all of these modes sharing a focus on the movement of people and goods, they are often at odds with each other. Traffic flow is a primary concern for specialists associated with designing roadways for automobile use; at the same time, the volume and speed of roadway traffic play a large part in affecting non-motorized mode share, particularly through their effect on both perceived and actual level of safety (Jacobsen, 2009; Akar and Clifton, 2009; Titze et al., 2010). Lower perceived level of safety will limit desire to walk or ride (Pucher and Dijkstra, 2003). In addition, facilities that encourage bicycling in mixed traffic (no dedicated bike facility) have been shown to be much higher in associated stress level (Hunt and Abraham, 2007). Walking may also be influenced greatly by volumes of traffic, as narrow spaces greatly reduce the desirability of walking alongside traffic (Asadi-Shekari et al., 2013). Time may also be a factor affecting likelihood to bike or walk (Akar and Clifton, 2009; Rietveld and Daniel, 2004), as is distance (Senevarante and Morall, 1986). Fragmentation represents the complexity of the division of policy fields, and is an important piece of why categorization of a problem may greatly affect the success of policy solutions.

Policies must also struggle against a diversity of other challenges to their success; they might be the victims of their own qualities, for example too simplistic or not in time with the cultural zeitgeist. They must also be technically viable. Finally, they must be in line with the values of the organization, wider policy field, and the greater political system as a whole. The policy stream tends to produce a 'short list' of proposals, which are not consensus best policies (socially-agreed best alternative), but agreed by all to be prominent policy ideas. For this reason, visibility of a policy solution is crucial. In the case of bicycling, it may be the case that growing support for bicycling is merely the result of increased visibility of it as a viable policy solution.

This point is mirrored by findings in the bike/ped literature: comparisons of localities and reviews of existing literature suggest that policies and programs to support non-motorized travel demand an appreciation of the local context to be successful (Pucher et al., 2010; Heinen et al., 2010). The importance of appreciating context for successful implementation policies makes case studies particularly valuable for those hoping to mimic the success of other regions; a good qualitative analysis of the process of a city or state's development of policies can offer clues as to what steps are important, what considerations must be made, and who should be involved (Hanson and Young, 2008), as well as important events that provided opportunities for steps forward (Buehler and Handy, 2008; Hanson and Young, 2008).

The combination of these challenges helps to explain why the adoption of bicycle and pedestrian-friendly policies has differed so dramatically from place to place, but it is important to consider again the strong evidence cited by bicycle and pedestrian proponents for the ability of walking and bicycling to resolve those problems potentially identified in the problem stream. In fact, active transport may provide extra value by combating multiple problems, and in doing so might help to improve the quality of urban living (Unwin, 1995).

3.3. The political stream

Considering the nature of the problem and solution streams, it is logical that they contain most of the CBA-based work. If policy was dictated by the rational model of decision-making as suggested by CBA, then the only additional factor playing a part in the policy process would be the quality of available information. However, in actuality the policy process is dictated by agents who have specific values, which in turn affect the evaluation of available information and the search for more (Burstein, 1991); these agents are part of the politics stream. This third and final stream is made up of the overall political climate of a given place, including individuals, institutions, and ideologies. Changes in the citizenry, election results, partisan-leanings, or politically charged events may all affect the political stream, and in turn, agendas; this means that the path of the political stream is at any point entirely dependent on local, regional, and national moods that may be prone to shifting. Cole et al. (2010), in their interviews of Australian transportation administrators, found that much of the resistance to cycling and walking policies was felt in the form of a distinct "car culture" in the country, which often led to apathy toward active transportation policies. This gauging of the public mood can be very influential: for example, the current national economic difficulties in the U.S. have not only limited budgets, but have also created a political climate that is less conducive to many new policies as the mood lends itself to a more cautious conservatism. Mood may come from the general public, and be reflected in their voting and feedback to elected officials, or it may be passed top-down from higher officials. Although political/social considerations influence both bicycle and pedestrian behaviors and policies, there may be reasons to consider such considerations more influential

around bicycling in the modern dialectic, as evidenced by the prominent public dialogue around bike share and bicyclist behavior.

In addition to mood, the political stream is greatly affected by the balance of organized forces. There may be differing degrees of consensus or conflict between political actors, which plays a large part in the agenda-setting process. Agenda setting may also be affected by the changes in actors. As new actors enter the arena, new priorities will emerge and the agenda may shift. For example, the failure of of avid cycling supporter Jim Oberstar's re-election bid for Representative of Minnesota in 2010 may have affected the frequency with which federal funding programs came under attack during 2011. It certainly led to changes in staffing and may have affected the willingness of fellow members of Congress to fight for bicycle and pedestrian legislation and funding.

Another major component of the politics stream is public image and cultural identity. Cycling and walking do not have the same identity in the United States that they enjoy in other countries; this cultural difference often hampers the efforts of bicycling and walking advocates to be taken seriously when it comes to legislating for either (Pucher et al., 1999). The politics stream is also particularly vulnerable to other differences in culture between localities. Some states might be likely to take bicycle infrastructure seriously because of their attitudes as a populace, while others may not. The difference in political climates and cultural norms across locales is not a major topic of discussion in the literature, but a cursory examination of the political climates of bicycle-supportive cities is enough to suggest that research on this topic is warranted.

This literature paints the picture of North American cities (such as Davis and Portland) attempting to mimic the success of European cities such as Amsterdam and Copenhagen in their bicycling policies in the face of a cultural and institutional climate seen as less conducive to cycling and walking. Often the case studies or comparisons will attempt to identify features of cities (including climate, density, demographics, facilities, laws) that have contributed to it being either more or less bicycle friendly. Dill and Carr (2003) found that the most significant factor influencing bicycle mode share in major U.S. cities was the amount of bicycle infrastructure available. Based on their comparative case studies, Pucher et al. (1999) identify eight factors that differentiate bike-heavy cities from those who have very low usage: public attitude and culture, public image, city size and density, cost of car use and public transit availability, income, climate, danger, and infrastructure (supported by the findings of Heinen et al. (2010)).

3.4. The policy window and cycling

While these three streams (problems, solutions, and politics) operate independently, they may move closer or further apart; occasionally, an event will provide an opportunity for the streams to couple together and for a problem to be paired with a solution, which is then successfully implemented. For such an open policy window to be taken advantage of, the streams must be running somewhat parallel: a problem must be identified, a solution available, and support garnered. An actor may be involved in any number of the independent streams to some capacity, and identify an opportunity (which can take any number of forms) to use a particular solution as a way to address specific issues, within a particular political context. Three factors may affect the frequency of policy windows and make them more likely to be taken advantage of once open: the occurrence of other policy windows, the effect of spillovers, and the presence of policy entrepreneurs. Of particular interest is the role of policy entrepreneurs in bicycle and pedestrian policy as agents responsible for coupling the streams. Considering the representation of the role of key individuals within memoirs and journalistic pieces (Birk and Kurmaskie,

2010; Mapes, 2009; Wray, 2008), it may be the case that one major gap within the existing knowledge is not the detailed factors at work in individual decisions to ride, but rather an appreciation of the role of these policy entrepreneurs.

Looking at the bike/ped literature, there is a large body devoted to understand why mode share differs from city to city. As a whole, the U.S. has a bicycle mode share of less than 1%, while the Netherlands has a national mode share of 30% (Pucher et al., 2010). Within the United States, cities with the highest usage have mode shares somewhere between 2% and 7%, with the lowest mode shares of large metro areas well below half of one percent (League of American Bicyclists, 2013). In light of the dramatically different levels of implementation of so-called "bicycle-friendly" policies or design strategies from place to place, there is demand for research comparing the policies, programs, climates, and attitudes of different localities in the hopes of better understanding their successes or failures. Some of this work focuses on case studies of specific places such as San Francisco (Cervero and Duncan, 2003), Davis, California (Buehler and Handy, 2008), or Portland, Oregon (Dill and Voros, 2007), while the rest focuses on comparisons of places (Pucher et al., 1999, 2010; Steinman et al., 2010; Heinen et al., 2010; Ferguson and Montgomery, 1993; Ochia, 1993; Dill and Carr, 2003; Providelo and Sanches, 2011).

This work might be considered as part of the solution stream (as it contributes to an understanding of the applicability of policies to solving problems), but it may better be categorized as contributing to understanding the policy window. The comparison of cities is generally intended to identify factors responsible for successful implementation and growth in bicycling/walking; MSF allows us to make sense of this popular segment of research by understanding it as focusing on the policy window (the conditions needed for change). By placing it in this alternative framework, attention is drawn to those conditions, and to the role of particular actors in taking advantage of conducive conditions.

4. Policy entrepreneurs as coupling agents

Policy entrepreneur is a term that can incorporate a variety of policy actors, focusing not only on their official role in the policy process but on how they have acted as advocates to bring streams together (Kingdon, 1984). Policy entrepreneurs may enter the process at any point in any of the streams, and may be vocal advocates for a problem (e.g. environmental activists), for a policy solution (e.g. pro-cap and trade academics), or they may be political actors. Sometimes this advocacy is done for the sake of personal interests, or to promote a policy entrepreneur's own values, or just to participate in the process of advocacy itself.

Compared to the frequency of the discussion of costs and benefits of cycling facilities and cycling itself, mention of policy entrepreneurs is very limited in the existing research on bike and pedestrian policies. However, when mention is made it is often done so with a staunch emphasis on how their presence was crucial; in his lengthy qualitative work on bicycle advocacy, Mapes (2009) frequently returns to the role of specific figures in bringing bicycle and pedestrian policies to the forefront. Hanson and Young (2008), in their analysis of Arlington, Virginia, point directly to the entrepreneurial role of county leaders as responsible for aligning problems and solutions to institutionalize bicycling. Wray (2008) identifies a number of influential political figures that fit this model, including former House Transportation and Infrastructure Committee Chairman Jim Oberstar, an avid cyclist whose work led to the incorporation of sustainability and public health into federal mandates for transportation planning, as well as the expanded consideration of bicycles as modes of transportation from the perspective of the federal government (Wray, 2008). This active

pairing of problems and solutions from the streams perfectly characterizes the MSF concept of policy entrepreneurs.

Often, the role of policy entrepreneur is played by sympathetic or supportive political figures; other times it is played by advocacy organizations that may lobby actively for better policies (Patton, 2006). Comparison case studies reveal that the success of local-level cycling policies is associated with the presence of consistent pressure on political actors by organized bicycling groups (Pucher et al., 1999; Buehler and Handy, 2008). Across the country, bicycle advocates have been responsible for incremental victories in budget allocations, bike infrastructure, improved city planning strategies, and right-of-way laws (Friel, 2005). They have paired with environmental groups (Horton, 2006), public health officials (Wakefield, 2004; Unwin, 1995; Pucher and Dijkstra, 2003; Finkelstein et al., 2010), and even bus companies (Baker, 1997).

Although a policy entrepreneur can come from any particular stream (for example, an advocate could come from the solution stream, a politician from the politics stream, or a researcher from the problem stream), what matters is that they bring together tools and information from each stream (e.g. the advocate who partners with other stakeholders to implement a large project or influence a planning program) when conditions are favorable (for example, during a Transportation Improvement Program update). The result of this bringing together of streams of problems, solutions, and political will and favorable conditions is what makes change possible, from the perspective of the MSF. This paints the picture of a complicated process for improving policies, involving much more than just the rational comparison of cost–benefit ratios to determine the appropriate course of action; however, there is still a place for CBA.

4.1. CBA within MSF

CBA's limitations as a guiding framework have been noted, but nonetheless it serves as a valuable tool and perspective for contributing information on the policy problem and policy solution streams. By pairing a particular policy (and associated costs) with the benefits of such a policy in terms of specific policy problems, CBA acts as a sort of experimentation for finding opportunities where a pairing of the streams might be effective and worthwhile. As an analytical tool, it offers policy actors approachable information that can be packaged and sold in the politics stream as a way to garner support, and in that way, CBA might be best understood as one tool in the tool belt of the policy entrepreneur, facilitating the policy window and the pairing of the three streams.

5. Conclusions

It seems clear, reviewing the state of the field, that there is much to be gained by a more complete understanding of the process of crafting and implementing bicycle and pedestrian policies. While very helpful for practical decision-making, and naturally suited to the transportation policy arena because of its preference for quantitative models, cost–benefit analysis is only one piece of a more complex process of policy creation. The incorporation of more complete policy process frameworks such as multiple streams allows for the inclusion of valuable concepts such as policy entrepreneurs, advocacy organizations, and policy windows. It also helps planners, advocates, and policymakers to better appreciate the variety of factors affecting the implementation of such policies, and may provide clues for how to improve their efforts. A more thorough review of the flow of the independent streams could help proponents to identify underlying

differences between those localities with high mode shares and those without; in doing so it will likely provide valuable blueprints for future efforts.

Despite the selection of multiple streams as an alternative process model for this paper, there are also other competing models which may have explanatory value; particularly Sabatier and Weible (2007) advocacy coalition framework (ACF). The ACF argues that policy change is best understood as the result of competition within policy subsystems comprised of coalitions of actors, coupled with exogenous influences. It would be valuable to investigate the process of bicycle and pedestrian planning and policymaking itself to look for parallels to these (and other) theories, and develop a more detailed understanding of the bike/ ped planning and policy process.

There are other suggested directions for further research in this field, namely a dedicated look at the role of policy entrepreneurs in bicycle and pedestrian policy, and transportation policy as a whole, similar to what and Font and Subirats (2010) have done with water policy in Spain, or Mintrom (1997) with entrepreneurs at work in education policy. Similarly, a detailed look at the role of advocacy organizations in the planning process would likely reveal some interesting information about how different actors interact to influence outcomes, plans, and programs with regard to bicycling and walking. Future research should also embrace an improved qualitative methodology, to better determine the range of factors responsible for the success or failure of bicycle and pedestrian initiatives.

Finally, more needs to be done to understand the causal process for successful policies. The literature on bicycle and pedestrian master plans suggests that bicycling policies tend to develop from the bottom up, increasing in size and scope as the smaller programs are no longer sufficient (Steinman et al., 2010). A potentially growing trend of "devolution" in transportation, where governments pass on responsibilities to increasingly local bodies, might support this claim (Giuliano, 2007). However, the pressure placed on states to implement by the Federal government (Ferguson and Montgomery, 1993), and the efforts of some state governments to put pressure on cities, suggest that even if this is the case, it is not necessarily the sole or primary direction of success.

The diversity of work being done, coupled with the enormous range of potential future research, paint the picture of a field that is only in its infancy. As research expands, and the pool of available information improves in depth and diversity, it may serve as the foundations of better arguments and more successful advocacy efforts. For proponents looking at the recent growth in bicycle mode share across the country and hoping to fuel this trend, this is an exciting prospect. Improvements in bicycle and pedestrian scholarship could provide useful tools for advocacy, policy implementation, and might provide opportunities to test a variety of prominent theories within public policy and public administration, as well as transportation planning and policy.

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