A significant amount of research in the emergency management discipline has focused on understanding measures individuals and households can take to prepare for a hazard event and then determining factors that influence whether or not individuals decide to undertake them (Tierney, Lindell, & Perry, 2001). The purpose of this essay is to critically examine this research and those factors which have been identified through it. Specifically, this essay pinpoints a number of challenges associated with preparedness as a dependent variable within this body of literature, as well as other issues in the research that potentially impact the generalizability of findings. The paper then discusses how risk perception, past experience, sociodemographic characteristics, and other factors have been used to attempt to explain individual and household preparedness behaviors, mostly with inconsistent results. The essay concludes with suggestions for advancing the level of knowledge surrounding individual and household preparedness within the emergency management discipline. It should be noted that although a host of public opinion surveys have been conducted on this topic, given the length and scope of the paper, only the academic literature is referenced and discussed. In addition, this essay focuses solely on preparedness behaviors and does not address avoidance behaviors, such as not using particular transportation means or avoiding public place (see for example: Bourque, Mileti, Kano, & Wood, 2010; Lee & Lemyre, 2009; Torabi & Seo, 2004).

Challenges with Preparedness as a Dependent Variable

In order to consider what variables may explain or influence individual and household preparedness, it is first necessary to discuss what is meant by preparedness. Broadly speaking, disaster preparedness seeks to "enhance the ability of social units to respond when a disaster occurs" (Tierney et al., 2001, p. 27). It would follow then, that individual and household preparedness refers to developing strategies for an individual or familial response to a hazard event and ensuring the availability of necessary resources to adopt those strategies (Tierney et al., 2001). While easy to conceptualize, preparedness has proven challenging to uniformly operationalize as a dependent variable. The academic

community seems to be in agreement that the most appropriate way to operationalize preparedness at the individual and household level is to consider preparedness activities that could be undertaken by these subunits and then measure the instances of those activities being adopted (Tierney et al., 2001). However, there are substantial differences in how these activities are determined and assessed. For example, Spittal, Walkey, McClure, Siegert, and Ballantyne (2006) found that over 18 different measurement tools for seismic preparedness had been published since 1981, a number which does take into account instruments used for other hazards. Some had measures of four or five items (see for example: Dooley, Catalano, Mishra, & Serxner, 1992; Showalter, 1993). Others used scales ranging between 12 and 27 items (see for example: Burby, Steinberg, & Basolo, 2003; Lindell, Arlikatti, & Prater, 2009; Mulilis & Duval, 1995; Mulilis & Lippa, 1990). Further complicating the issue of measurement, some of these longer scales assess activities that could arguably be considered mitigation, such as strengthening a house or chimney, having an engineer assess the home, bolting furniture and water heaters to the wall, or latching cupboards (see for example: Andrews, 2001; Burby et al., 2003; Farley, 1998; Spittal et al., 2006). Even with activities that appear across the majority of instruments, such as having a family emergency plan, stockpiling food and supplies, or shutting off utilities in the home, there are differences in specificity in how these activities are measured that may create challenges. For example, one instrument may ask a general question regarding whether or not individuals have stockpiled supplies (see for example: Menard, Slater, & Flaitz, 2011; Phillips, Metz, & Nieves, 2005), whereas another may explicitly list out food, water, and other individual survival items (see for example: Burby et al., 2003; Farley, 1998; Spittal et al., 2006). This could lead to differences in how respondents answer the questions. In addition to having a variance in measures and differing specificity within similar measures, these instruments also lack a standard scoring mechanism (Spittal et al., 2006). Many also lack reliability measures (Perry & Lindell, 2000; Spittal et al., 2006). Such a diverse and unstandardized group of measures means that caution must be used when considering the

influence of independent variables across studies, as preparedness may be operationalized quite differently in each. As such, the information presented in the section describing the independent variables that influence preparedness should be viewed with a certain level of skepticism and the challenges identified above should be kept in mind as one considers the incongruences in the research.

Other Challenges Associated with Studying Individual and Household Preparedness

In addition to the challenges identified above, there are other issues associated with explaining and generalizing the influences on individual and household preparedness. Just as inconsistencies exist with operationalizing preparedness as the dependent variable, so does the operationalization of various independent variables also differ (Lindell & Perry, 2000; Tierney et al., 2001). This is especially true of risk perception (Lindell & Whitney, 2000). Research designs have also been widely divergent, with most leveraging cross-sectional quantitative surveys as their primary data collection method (Lindell & Perry, 2000; Tierney et al., 2001). However, some have used longitudinal surveys (see for example: Turner, Nigg, & Heller-Paz, 1986), while others have leveraged qualitative interviewing (see for example: Kusenbach, Simms, & Tobin, 2010; Tekeli-Yesil, Dedeoglu, Tanner, Braun-Fahrlaender, & Obrist, 2010). The studies have also collected data over a range of hazard contexts (Tierney et al., 2001). For example, some have focused on preparedness in high hazard areas but under normal conditions where there is no approaching hazard or an upsurge in awareness efforts (see for example: Eisenman, Glik, Gonzalez, Maranon, Zhou, Tseng, & Aceh, 2009; Horney, Snider, Malone, Gammons, & Ramsey, 2008; Kapucu, 2008; Kusenbach et al., 2010). Others have considered preparedness in the context of recent disasters (see for example: Mileti & O'Brien, 1992; Siegel, Shoaf, Afifi, & Borque, 2003; Kim & Kang, 2009). Still others have studied preparedness in light of public awareness initiatives (see for example: Mileti & Darlington, 1995; Mileti & Fitzpatrick, 1993; Mulilis & Lippa, 1990). And others have considered preparedness behaviors in response to warnings (see for example: Edwards, 1993; Farley, 1998; Showalter, 1993; Turner et al., 1986). There has been some research on preparedness in

hurricane-prone areas (see for example: Horney et al., 2008; Kapucu, 2008; Kusenbach et al., 2010; Kim & Kang, 2009) or related to terrorism (see for example: Eisenman, Fielding, Long, Setodji, Hickey, & Gelberg, 2006; Bourque et al., 2010; Lee & Lemyre, 2009; Torabi & Seo, 2004). However, the majority of the academic research has focused on preparedness in relation to seismic hazards (Lindell & Perry, 2000; Spittal et al., 2006; Tierney et al., 2001). And even within this seismic focus, the attention has been heavily centered on the state of California (Lindell & Perry, 2000). These additional challenges and considerations should be taken into account, along with the issues identified with preparedness as a dependent variable, as one considering the findings below.

Independent Variables Associated with Preparedness

For individuals and households to be motivated to initiate actions in preparation for disaster, it would seem to follow that these individuals must perceive a risk to themselves or to their families from a potential hazard event. Hence, risk perception has been a popular variable examined by researchers studying individual and household preparedness. However, the results of this investigation have shown the impact of risk perception on individual and household preparedness to be inconsistent. Some empirical studies have found higher levels of perceived risk are associated with increased preparedness behaviors (see for example: Sattler, Kaiser, & Hittner, 2003; Dooley et al., 1992). Others have demonstrated no statistically significant results between perceived risk and either intention to adopt or actual adoption of preparedness activities (see for example: Lindell & Prater, 2000; Lindell & Prater, 2002; Lindell & Whitney, 2000). Still other studies suggest that risk perception does increase preparedness behavior, but only if the risk has been personalized, meaning judgments about the likelihood of an event occurring are unrelated to preparedness unless the individual truly believes the event will impact him or her directly (see for example: Farley, 1998; Spittal, McClure, Seigert, & Walkey, 2008; Tekeli-Yesil et al., 2010; Turner et al., 1986). This qualifier of personalizing risk could limit the impact of risk perception on individual preparedness behaviors given that, in a number of

instances, researchers have found that individuals maintain an "unrealistic optimism bias" (see for example: Lindell & Whitney, 2000; Mileti & Darlington, 1995; Paul & Bhuiyan, 2010; Tekeli-Yesil, Dedeoglu et al., 2010; Westgate, 1978; Kim & Kang, 2009). This means that despite their perception that the risk to the overall community is high, individuals do not think of themselves as at risk (Lindell & Whitney, 2000). Lindell and Whitney (2000) have suggested that the differential impact of risk perception on preparedness behavior could be attributed to variations in definition and measurement of risk perception. Some definitions have come from the psychometric tradition, others focusing on dread and severity associated with risk, and still others measuring perceptions based on the probability and imminence of an event (Basolo, Steinberg, Burby, Levine, Cruz, & Huang, 2009). Until a standard conceptualization and measurement of risk perception is used, it may be difficult to explain the variance in its impact on preparedness behavior.

Past scholarship has also focused on the notion that those individuals and households with previous disaster experience will be more inclined to undertake preparedness activities thereafter. This proposition has also been met with mixed empirical results. Numerous scholars have found truth in this association (see for example: Faupel, Kelley, & Petee, 1992; Lindell & Prater, 2000, 2002; Russell, Goltz, & Bourque, 1995; Tekeli-Yesil et al., 2010; Turner et al., 1986). Others, however, have indicated that past disaster experience has little or no bearing on preparedness behaviors for future disasters (see for example: Basolo et al., 2009; Harvatt, Petts, & Chilvers, 2010; Kirschenbaum, 2002; Mileti & Darlington, 1995; Rustemli & Karanci, 1999), including past terrorism events (Bourque et al., 2010). Additional research has qualified disaster experience, suggesting that it is not simply having experienced a disaster that drives future preparedness, but rather having past physical and financial damages or lingering fear or anxiety as a result of a disaster (see for example: Heller, Alexander, Gatz, Knight, & Rose, 2005; Rustemli & Karanci, 1999; Sattler et al., 2000; Siegel et al., 2003; Takao, Motoyoshi, Sato, & Fukuzono, 2004). This could suggest risk perception as a mediating variable if physical or emotional

damages from a past event served to personalize risk (Lindell & Hwang, 2008). The literature also suggests that the impact of disaster experience on future preparedness behaviors may fade with time (see for example: Dooley et al., 1992; Rustemli & Karanci, 1999; Sattler et al., 2000; Weinstein, 1989). This temporal dimension may offer some explanation as to the inconsistencies in the association between past experience and preparedness behaviors, given that the time lapse between the previous event and the research endeavor was not the same across studies.

Research has also studied the association between a variety of sociodemographic characteristics and preparedness behaviors, including gender, race, ethnicity, age, education, income, home occupancy, marital status, and presence of children in the household. These factors have been linked in research to vulnerability to disasters (see for example: Bolin & Stanford, 1991; Cutter, 2001; Fothergill, 1996; Phillips, 1993; Tierney et al., 2001). This would suggest that individuals with these characteristics may have a greater need to prepare, but may also have more barriers to accomplishing preparedness activities due to resource constraints, lack of knowledge of what to do, or power differentials (Tierney et al., 2001). Like risk perception and past experience, the association between sociodemographics and preparedness behaviors remains unclear in most areas. This could stem from the fact that although these factors are being discussed as discrete influences, they are often related, making it difficult to extricate the independent and interdependent influences that these different factors may wield on preparedness behaviors (Tierney et al., 2001). Despite these challenges, the empirical findings for each of the characteristics above are detailed in the following paragraphs.

Fothergill (1996) suggests that women and men may differ in the types of preparedness activities that they undertake, but a number of studies have indicated that gender is unrelated to preparedness behaviors (see for example: Nguyen, Shen, Ershoff, Afifi, & Bourque, 2006; Lindell & Hwang, 2008; Siegel et al., 2003; Spittal et al., 2008; Kim & Kang, 2009). In other research, the influence of gender is found to be modest at best (see for example: Bourque et al., 2010; Lindell & Prater, 2000).

Kirschenbaum (2002) finds gender to be a factor only for preparedness activities related to obtaining knowledge and skills, such as first aid or fire control, with men being more likely than women to be skilled and knowledgeable in these areas. This suggests that gender alone may not be a sufficient predictor of preparedness behaviors.

Research regarding how race and ethnicity impact preparedness has also produced inconsistent results. Some studies have found no association between race/ethnicity and preparedness actions (see for example: Bourque et al., 2010; Lindell & Prater, 2000; Nguyen et al., 2006; Siegel et al., 2003; Kim & Kang, 2009). Others, however, indicate that Whites are more likely to prepare than either Latinos/Hispanics or African-Americans (see for example: Edwards, 1993; Faupel et al., 1992; Faupel & Styles, 1993; Turner, et al., 1986). Peacock (2003) reports that no differences exists in the propensity of Whites and Hispanics to prepare for a disaster, but that African-Americans are less likely than both to prepare. Lindell & Hwang (2008) indicate that non-Whites are more likely to make flood adjustments, while Whites are most likely to purchase flood insurance. In regards to terrorism, Torabi and Seo (2004) report that more African-Americans than Whites organized supplies due to the September 11th terrorist attacks. Eisenman et al. (2006) indicate that more African-Americans established an emergency plan than other races/ethnicities and Latinos/Hispanic and African-Americans were more likely than Whites and Asian/Pacific Islanders to purchase or maintain supplies. However, since both these studies have examined preparedness actions taken specifically as a result of a terrorism threat, it is possible that the numbers of minorities taken preparedness actions could appear inflated since Whites may have acted previously based on the threat from other hazards. As with gender then, the results of the academic research suggest that race/ethnicity alone may not be an adequate predictor of preparedness behavior.

Studies that have examined age as it relates to preparedness behaviors have also yielded mix results. Some studies suggest that age is positively related to preparedness (see for example: Dooley et al., 1992; Sattler et al., 2000; Siegel et al., 2003; Spittal et al., 2006; Spittal et al., 2008, Turner et al.,

1986). However, Heller et al. (2005) finds that older respondents are engaged in less preparation, especially long-time residents, and that the most prepared individuals are those that are younger (30-43) with small children. Kirschenbaum (2002) suggests that being older positively relates to having more basic supplies to survive after a disaster, but does not impact other preparedness activities. Others have found that age has no impact on preparedness behaviors (see for example: Rustemli & Karanci, 1999; Kim & Kang, 2009). It has been suggested that age may actually be curvilinear, with both youngest and oldest residents being the least prepared (Boscarino, Adams, Figley, Galea, & Foa, 2006; Heller et al., 2005), although this proposition has not been systematically tested. Future research along these lines may be productive in resolving some of these discrepancies.

A definitive link between education level and preparedness behaviors has also not been established in the literature. There are some studies that suggest that higher education levels lead to enhanced preparedness (see for example: Edwards, 1993; Liu, Quenemoen, Malilay, Noji, Sinks, & Mendlein, 1996; Menard, Slater, & Flaitz, 2011; Russell et al., 1995; Turner et al., 1986). However, a number of others find no association between education and preparedness behaviors (see for example: Faupel et al., 1992; Heller et al., 2005; Jackson, 1981; Lindell & Prater, 2000; Rustemli & Karanci, 1999; Siegel et al., 2003; Spittal et al., 2008; Kim & Kang, 2009). Kirschenbaum (2002) found that higher levels of education are associated only with preparedness activities related to obtaining knowledge and skills, such as first aid or fire control. Paul and Bhuiyan (2010) indicate that in Bangladesh, higher education levels are negatively associated with preparedness activities, suggesting that individuals with higher incomes typically live in newer housing designed to be earthquake-proof and therefore do not take as many preparedness actions. This implies that findings do not necessarily translate across societies, indicating a need for more cross-cultural research on these topics (Quarantelli, 1997).

Researchers have postulated that those with lower incomes may be hindered in preparedness efforts due to lack of resources. This proposition has been support by a number of studies which have shown that indeed lower income groups demonstrate fewer preparedness behaviors than those with higher income (see for example: Bourque et al., 2010; Edwards, 1993; Lindell & Prater, 2000; Mileti & Darlington, 1995; Phillips et al., 2005; Russell et al., 1995; Turner et al., 1986). However, other research has shown that income is not correlated with preparedness activities (see for example: Faupel et al., 1992; Heller et al., 2005; Jackson, 1981; Rustemli & Karanci, 1999; Siegel et al., 2003; Kim & Kang, 2009). As with education, Paul and Bhuiyan (2010) have found that income is negatively correlated with preparedness for the same reasons as described above. Thus, although this propositions intuitively seems to makes the most sense in regards to a direct link between a sociodemographic characteristic and an action (or lack of action), it has not held true across the literature.

Of the sociodemographic characteristics studied, homeownership and home type appear to be the most consistent predictors of preparedness behavior. Research has suggested that dwellers in mobile homes and multi-unit buildings are less likely to be prepared than those who live in single-family homes (see for example: Horney et al., 2008; Kusenbach et al., 2010; Siegel et al., 2003). Homeowners are more likely to be prepared than those who rent (see for example: Burby, Steinberg, & Basolo, 2003; Faupel et al., 1992; Russell et al., 1995; Siegel et al., 2003; Spittal et al., 2006; Spittal et al., 2008; Takao et al., 2004). Only two studies found homeownership to have no association with preparedness behaviors (Lindell & Prater, 2000; Kim & Kang, 2009). It has been suggested that this difference in preparedness actions between homeowners and renters is a result of the fact that renters move more frequently and are more focused on the short-term, while homeowners have ties to the property and greater knowledge of options for action and financial resources than those lacking tenure (Harvatt et al., 2011). However, this explanation has not been systematically evaluated through additional research.

Researchers have also looked at marital status and the presence of children in the household, proposing that those who have familial responsibilities or duties to others would be more likely to undertake preparedness behaviors than those without these ties. Some studies have shown that being married is indeed associated with higher levels of preparedness (see for example: Dooley et al., 1992; Lindell & Prater, 2000; Russell et al., 1995; Turner et al., 1986). So too is having children in the home (see for example: Dooley et al., 1992; Edwards, 1993; Faupel et al., 1992; Russell et al., 1995; Turner et al., 1986). However, Kirschenbaum (2002, 2006) indicates that marital status is not associated with increased preparedness behaviors. And both Kirschenbaum (2002, 2006) and Lindell and Prater (2000) report that the presence of children in the home is also not a predictor of preparedness. Kirschenbaum (2006) suggests that preparedness is less a product of marital status and the presence of children in the home than it is a result of the processes that occur within the home, e.g. social networks, gender role obligations. This idea could be advanced to determine if a focus on networks and obligations helps to explain some of the incongruences found in these studies.

In additional to risk perception, past experience, and sociodemographic characteristics, a number of other variables have been studied to determine their level of association with individual and household preparedness. Some have been found to be significant. Seeing others prepare for an event and discussing preparedness activities with others increases likelihood of preparedness (see for example: Farley, 1998; Heller et al., 2005; Major, 1993; Mileti & Darlington, 1995; Turner et al., 1986) A number of studies have found that preparedness is higher amongst those who have lived longer in their current home or neighborhood (see for example: Dooley et al., 1992; Russell et al., 1995; Turner et al., 1986). However, others have found length of tenure to have no impact (see for example: Kirschenbaum, 2002; Lindell & Prater, 2000). The propensity to engage in outside actions that reduce vulnerability to harm, such as medical checkups, also have been found to be a predictor of higher levels of preparedness for disasters (Spittal et al., 2008). Researchers have determined that warnings for seismic events may

increase preparedness activities (see for example: Farley, Barlow, Finkenstein, & Riley, 1993; Kunreuther, 1993; Showalter, 1993; Turner et al., 1986), but such increases may only be temporary (Farley et al., 1993). Brochures and other efforts to raise public awareness regarding disaster preparedness activities, such as training sessions or focus groups, have been found to positively impact the adoption of preparedness activities (see for example: Blanchet-Cohen & Nelems, 2010; Eisenman et al., 2009; Faupel et al., 1992; Mileti & Darlington, 1995; Mulilis & Lippa, 1990). But, as with warnings, gains may be short-lived (Mulilis & Lippa, 1990). This suggests that the results of both warnings and awareness efforts may be due to a temporary altering of risk perception (Mulilis & Lippa, 1990). Those who believe protection is a personal responsibility have shown higher levels of preparedness activities than those who believe it is not (see for example: Lindell & Whitney, 2000; Mulilis & Duval; 1995). The extent individuals feel in control of their own lives or what happens to them impacts preparedness, with those who feel they have a greater locus of control exhibiting more preparedness behaviors (see for example: Phillips et al., 2005; Rustemli & Karanci, 1999; Sattler et al., 2000; Tekeli-Yesil et al., 2010; Turner et al., 1986). Individuals and households are more likely to take actions requiring minimal effort and cost (see for example: Bourque et al., 2010; Harvatt et al., 2011; Mileti & Fitzpatrick, 1993; Tekeli-Yesil et al., 2010). The perceived efficacy of an action and its utility for other purposes increase likelihood of preparedness activities being adopted (see for example: Lindell & Prater, 2002; Lindell & Whitney, 2000).

Moving Preparedness Knowledge Forward

In order to continue to advance the discipline of emergency management, it is important to develop a unique body of knowledge that builds from propositions and conceptual variables into more advanced ways of thinking, such as classifications, typologies, or models (Jensen, 2010). In relation to theory development then, our knowledge of individual and household preparedness remains in a very rudimentary stage. Although much empirical research has been conducted, the results are inconsistent,

meaning “we are only in the preliminary phase of discovering and understanding these complex relationships” (Tierney et al., 2001, p. 158). In order to move the discipline forward, an effort must be made to achieve a greater systematic knowledge, not only regarding who conducts these preparedness behaviors, but why they choose to do so, and what impact these preparedness behaviors have on their ability to actually cope after a hazard event (Tierney et al., 2001).

To achieve greater systematic knowledge regarding those variables that influence individual and household preparedness, a standardized set of activities could be developed, with hazard-specific preparedness activities added as necessary, along with a uniform scoring system. This would allow for replication both across communities and within communities at different times, as well as to examine any differences between hazards. In addition, there is little theoretical development occurring, as very few of the empirical studies have been based or linked to a theoretical construct (Lindell & Perry, 2000). There are models that exist that might serve as a place to begin theoretical testing. For example, the person-relative-to-event (PrE) model where individuals weigh knowledge, abilities, and financial resources in combination with the potential effectiveness of preparedness activities against the probability and imminence of a hazard event (Lindell & Whitney, 2000, Mulilis & Lippa, 1990) would be options to begin to think about how these various factors that influence preparedness and the relationships between them. Or another place to start could be the modified protection action decision model (PADM) advanced by Lindell & Perry (2000) where the interrelationships between the hazard, the household, the social context, and hazard adjustments are considered. Beginning to think in terms of these relationships can also advance the knowledge of preparedness from just understanding *who* prepares to identifying *why* people prepare (Tierney et al., 2001, p. 45), a critical step that allows the discipline to go from merely recognizing behavior to determining how to influence it.

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