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Adopted Individuals' Information Management Strategies for Managing Uncertainty about Genetic Family Health History

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ABSTRACT

Knowledge of genetic family health history (GFHH) plays an important role in encouraging individuals to take preventative health measures, but adopted individuals often face barriers to accessing this information. This study examines how uncertainty about GFHH is associated with various information management strategies for adopted individuals. We surveyed 154 adopted individuals to assess their uncertainty about GFHH, appraisals of the likely outcomes of information seeking, and preferences for information management. Data were analyzed using structural equation modeling. Results generally supported hypotheses, with (a) uncertainty discrepancy predicting anxiety and negative outcome assessments, (b) anxiety predicting negative outcome and efficacy assessments, and (c) negative outcome assessments generally predicting efficacy assessments and information management strategies. Efficacy assessments, however, were not significant predictors of information management strategies. The theoretical and translational implications of the findings are discussed.

The Centers for Disease Control and Prevention (CDC) defines *genetic family health history (GFHH)* as a "record of the diseases and health conditions in your family" (Centers for Disease Control and Prevention, 2019). Knowing one's GFHH can reveal pertinent information for determining risk factors for a variety of illnesses and chronic diseases, such as cancer, heart disease, and diabetes (Yoon et al., 2009). Healthcare providers often rely on a patient's GFHH to assess health risks and inform recommendations for health management (Rich et al., 2004) GFHH plays an important role for individuals seeking comprehensive healthcare, but various factors can constrain the accessibility of this information. Individuals who are adopted may struggle to find information about their GFHH if they are unsure about the identity of their birth parents (Siegel, 2012). Adopted individuals might also be reluctant to discuss concerns about GFHH with their adoptive parent(s) if conversations about one's birth parents are considered taboo or the adoptive parent(s) lack sufficient information (Docan-Morgan, 2021). Thus, adopted individuals can face a deficit of information about their GFHH and experience uncertainty about appropriate pathways for information management.

The theory of motivated information management (TMIM; Afifi, 2010) provides a useful framework for identifying factors that shape the strategies adopted individuals use to manage their uncertainty regarding GFHH. The theory suggests that individuals may seek or avoid information to manage a discrepancy between their perceived and desired levels of uncertainty about a situation (Afifi, 2010). This study applies TMIM to identify the factors that shape adopted individuals' preferences for managing uncertainty about their GFHH. In addition, this paper adds to the existing literature by considering support seeking as another potential strategy for managing uncertainty

discrepancies alongside information seeking or avoidance. Particularly for adopted individuals, where information about their birth parents and GFHH might be inaccessible, support seeking may be an alternative action individuals can take to manage their uncertainty about potential health risks.

Thus, the goals of this study are two-fold. First, this study applies TMIM to identify factors that are influential in shaping adopted individuals' information management practices around GFHH. Adopted individuals face unique challenges in obtaining information about their GFHH due to the circumstances of their adoption (e.g., open or closed adoption, displacement), barriers to accessing information (e.g., unknown identity of birth parents), and/or a lack of communication within the family, which can undermine efforts to seek GFHH information (Bowen et al., 2004). Second, this study aims to extend TMIM by considering support seeking as a possible strategy for managing uncertainty about GFHH. Thus, this study contributes to theory by considering how the mechanisms in TMIM might predict alternative information management strategies. Pragmatically, this research provides pertinent information for adoptive families and healthcare professionals navigating situations involving GFHH for adopted individuals.

Genetic family health history and adoption

There are a variety of factors that shape people's decisions to seek GFHH information. The most common barriers to acquiring a comprehensive GFHH are uncertainty about the amount of genetic information individuals desire (e.g., Baptiste-Roberts et al., 2007), emotions attached to information seeking (e.g., McAllister et al., 2007), and the myriad outcomes resulting from communication with family members (e.g., Peterson, 2005). Some individuals actively seek information about their GFHH because it increases awareness of health risks and allows for preventative lifestyle changes (Baptiste-Roberts et al., 2007). In these cases, increased closeness among family members tend to promote sharing of GFHH (Ashida et al., 2013). In addition, perceived self-efficacy to seek and cope with health information is a strong predictor of communication about GFHH (Rodríguez et al., 2016). In contrast, some individuals are hesitant to seek GFHH because they fear discovering they are at high risk for genetic diseases (Cox & Mckellin, 1999). For these individuals, maintaining uncertainty about their health risks is preferable to obtaining knowledge of potentially negative outcomes.

Adoption adds a host of additional issues related to obtaining GFHH. For most adopted individuals, the circumstances of their adoption prevent them from having control over whether, when, and how to seek GFHH information, which is often the primary motivation to seek contact with biological family members (Strong et al., 2017). Adopted individuals have a desire for hereditary health information (Grotevant et al., 2013) and their lack of access to this information is regarded as a health disparity (May et al., 2016b). Adopted individuals are faced with questions and concerns about their GFHH that prompt uncertainty and undercut judgments about their efficacy to obtain relevant information. Thus, understanding the motivations behind GFHH information management is valuable for promoting the wellbeing of adopted individuals.

Understanding adopted individuals' uncertainty management about GFHH

The theory of motivated information management nominates various mechanisms that drive people's information management practices under conditions of uncertainty (Afifi, 2010). This framework posits that when individuals experience a discrepancy between the amount of uncertainty they have about a situation and the amount of uncertainty they would like to have, they experience emotional reactivity that motivates them to resolve the discrepancy. The information management practices adopted by individuals in this context are a function of their emotional reaction to the uncertainty discrepancy, the expected outcomes of information seeking, and their perceived efficacy to obtain and cope with information that would resolve uncertainty.

The TMIM has been applied to a variety of health contexts, including the ways in which individuals seek sexual health information from partners (Dillow & Labelle, 2014), online information seeking about chronic illness (Kanter et al., 2019), family communication around organ donation (Afifi et al., 2006), married partners' conversations about end-of-life care (Rafferty et al., 2015), and adult children's conversations about caregiving for aging parents (Fowler & Afifi, 2011). In addition, some studies have applied TMIM to examine communication about family health history between children and parents (e.g., Rauscher & Hesse, 2014) and between romantic partners (e.g., Hovick, 2014; Kuang & Gettings, 2020). Given the uncertainty that adopted individuals experience about their GFHH and the complicated factors involved in seeking this information, applying TMIM in this context can be beneficial for understanding adopted individuals' information management practices around GFHH.

Uncertainty discrepancy as a predictor of emotion

The TMIM defines u*ncertainty discrepancy* as the difference between desired and actual levels of uncertainty (Afifi, 2010). In the interpretation phase of TMIM, people recognize that they have an uncertainty discrepancy about a situation and experience an emotional response, which could be positively or negatively valenced (Afifi & Morse, 2009). For example, if an individual experiences more uncertainty than they would like, they could feel anxious about the unknown or hopeful about the variety of possibilities for which uncertainty allows. Individuals engaging in GFHH conversations will often face an uncertainty discrepancy about how much they want to know and how much they already know about their GFHH (Rauscher & Hesse, 2014). For adopted individuals, the lack of direct access to information about their GFHH increases the likelihood for an uncertainty discrepancy. Prior research demonstrates that adopted individuals have a strong desire to acquire hereditary information, especially if it offers relevant health-related information (Grotevant et al., 2013).

Emotional reactions to the uncertainty discrepancy shape individuals' evaluation of the situation and their selection of uncertainty management strategies. Studies that have focused on uncertainty around GFHH have documented anxiety in response to an uncertainty discrepancy (e.g., Hovick, 2014; Rauscher & Hesse, 2014), as well as a range of other emotions, ranging from nervous and distressed to interested and proud (Rauscher & Hesse, 2014). Despite broadening the range of emotions that are theoretically possible, most tests of TMIM still tend to prioritize anxiety as a pivotal emotional response to an uncertainty discrepancy (e.g., Kuang & Gettings, 2018). For adopted individuals who are uncertain about their GFHH, anxiety is likely to be a particularly salient emotion given the potential for unknown health risks (McAllister et al., 2007). The prospect of connecting with one's birth parent(s) to uncover desired GFHH information can also provoke uncertainty. Thus, we focus on anxiety as the primary emotional experience that is elicited by an uncertainty discrepancy about GFHH in this context. Given that uncertainty and anxiety are key in adopted persons' motivation to manage GFHH information, we propose the following hypothesis:

H1: Uncertainty discrepancy about GFHH is positively associated with anxiety for adopted individuals.

Emotional responses as predictors of outcome assessments and efficacy assessments

The evaluation phase of TMIM is where individuals appraise the expected outcomes of information seeking and their perceived abilities to obtain desired information (Afifi, 2010). The theory posits that individuals make two types of evaluations during this phase: outcome assessments and efficacy assessments. *Outcome assessments* reflect individuals' perceptions of the potential pros and cons that come from seeking information about the issue. *Efficacy assessments* reflect individuals' confidence in their ability to gather the information needed to manage their uncertainty discrepancy. Three efficacy

judgments are relevant to uncertainty management practices: (a) communication efficacy, (b) coping efficacy, and (c) target efficacy (Afifi, 2010; Afifi & Weiner, 2004). *Communication efficacy* refers to individuals' appraisal that they have the skills necessary to successfully enact information seeking behaviors. *Coping efficacy* reflects individuals' beliefs about whether they can cope with the information they find. *Target efficacy* involves appraisals of whether the information provider has the ability and willingness to share information that reduces an individual's uncertainty discrepancy.

As outlined in TMIM, emotional responses to an uncertainty discrepancy shape the judgments individuals make about their ability to seek information to alleviate the discrepancy (Afifi & Weiner, 2004). Anxiety, in particular, is likely to be associated with more negative expectations with regard to information management. Adopted individuals may be anxious that efforts to obtain GFHH information may uncover alarming information (e.g., worrisome health risks; Strong et al., 2017) or strain relationships with their adoptive and/or birth parents (Van Oostrom et al., 2007). Similarly, anxiety might shape adopted individuals' expectations for how their family members will respond with regard to knowledge about a genetic propensity for illness (Rauscher & Hesse, 2014). Given the anxiety that adopted individuals have about their GFHH, they may be apprehensive to communicate about these circumstances, which may undermine their efficacy to communicate about GFHH and cope with the information that is discovered (Afifi & Morse, 2009). Thus, anxiety tends to produce more negative outcome expectancies and efficacy assessments. Accordingly, we propose the following hypotheses:

H2: Adopted individuals' anxiety is positively associated with negative outcome expectancies.

H3: Adopted individuals' anxiety is negatively associated with assessments of (a) communication, (b) coping, and (c) target efficacy.

TMIM also states that outcome expectancies predict efficacy assessments (Afifi, 2010), such that people feel more efficacy to pursue information that is expected to have positive outcomes and less efficacy when anticipating negative outcomes. In the context of GFHH, families characterized by hierarchy and homogeneity of beliefs tend to inhibit collection of GFHH, whereas families characterized by open communication tend to encourage active information collection (Campbell-Salome et al., 2019). Open and honest conversation is particularly important in adoptive families (e.g., Brodzinsky, 2006), as communication openness helps adopted individuals' understand their adoption and makes conversations about the birth family and genetic health information less taboo (e.g., Wrobel et al., 2013). In families with more restrictive communication norms, some family members may act as gatekeepers to GFHH information if they believe specific health conditions are private or they anticipate blame or judgment (e.g., Hamilton et al., 2005). Thus, when family communication establishes an expectation for restricted topics and uncomfortable interactions, individuals may lack confidence in their ability to initiate conversations about GFHH and doubt their family members' capacity for information sharing. Therefore, we propose the following hypothesis:

H4: Adopted individuals' negative outcome expectancies are negatively associated with assessments of (a) communication, (b) coping, and (c) target efficacy.

Outcome assessments as predictors of information management strategies

The final stage of TMIM is the decision phase, wherein individuals select an uncertainty management strategy based on their judgment of likely outcomes (Afifi & Weiner, 2004). TMIM focuses on two main strategies for information management: (a) information seeking (Afifi et al., 2004) and (b) information avoidance (Afifi & Afifi, 2009). *Information seeking* is most likely when individuals anticipate positive outcomes and have strong efficacy to obtain information (Afifi et al., 2004). *Information avoidance* occurs when individuals anticipate negative outcomes and have low efficacy

to obtain information (Afifi & Afifi, 2009). To extend the theory beyond information seeking, we nominate social support seeking as an alternative strategy that may be particularly beneficial in situations where information is not readily available, such as in the case of adopted individuals' GFHH. *Social support seeking* is defined as communication that solicits support to alleviate anxiety and reduce stress about a situation (Cutrona & Russell, 1990). In situations where individuals' uncertainty is misaligned with their desired level of certainty, social support can be instrumental in achieving cognitive reappraisal (Holmstrom, 2015), which is an effective means of reframing a situation so that desired and experienced uncertainty are no longer perceived as misaligned (Afifi & Weiner, 2004).

TMIM argues that outcome expectancies and efficacy appraisals predict uncertainty management behaviors (Afifi & Weiner, 2004). When individuals anticipate positive outcomes and have a strong efficacy to obtain information (Afifi et al., 2004b), they are more likely to engage in active information seeking behaviors. Many adopted individuals are highly motivated to seek GFHH information because the benefits of having this knowledge outweigh the potential downsides and challenges of obtaining it (Strong et al., 2017). On the other hand, when outcome assessments and efficacy judgments render information seeking too risky, individuals are more likely to avoid information (Afifi & Weiner, 2004). The act of avoidance helps individuals circumvent unwanted information that could be distressing (Brashers et al., 2000). Adopted individuals who anticipate that GFHH information will be challenging to access or reveal distressing health risks may be content to avoid information if it allows them to maintain their uncertainty about this situation. Following this logic, we advance the following hypotheses:

H5: Adopted individuals' (a) negative outcome expectancies are negatively associated and (b) efficacy assessments are positively associated with information seeking.

H6: Adopted individuals' (a) negative outcome expectancies are positively associated and (b) efficacy assessments are negatively associated with information avoidance.

Social support seeking is an alternate strategy that individuals might employ in contexts where desired information is not readily available. Research on social support shows that it enhances coping in situations that are anxiety provoking (e.g., Jones & Wirtz, 2006) and that it is an effective means of buffering stress (e.g., Auerbach et al., 2011). Social support is also associated with increased family well-being (Armstrong et al., 2005), and is characterized as a source of kinkeeping in families (Leach & Braithwaite, 1996); thus, adopted individuals may find comfort in the support of their adoptive families as they wrestle with uncertainty about their GFHH. Whereas adoptive parents may lack the efficacy to provide their adopted children with relevant information about their GFHH, they may be more confident in their ability to provide support to help them cope with this ambiguity. Adopted individuals are more likely to seek support if they perceive that the target can provide effective and sensitive support that will successfully improve their mind-set about the situation (e.g., Harvey-Knowles & Faw, 2018). If adoptees perceive that received support will be insensitive or offer ineffective comfort, they may enact alternate strategies for coping with uncertainty. Thus, we propose the following hypothesis:

H7: Adopted individuals' (a) negative outcome expectancies are negatively associated and (b) efficacy assessments are positively associated with support seeking.

The proposed hypotheses are summarized in Figure 1. We expect that uncertainty discrepancy about GFHH is positively associated with anxiety (*H1*). In turn, the anxiety is expected to be positively associated with negative outcome expectancies (*H2*) and negatively associated with efficacy assessments (*H3*). Consistent with TMIM, we anticipate negative outcome expectancies are negatively associated with efficacy assessments (*H4*). Next, we expect that negative outcome expectancies are negatively associated with information seeking (*H5a*) and support seeking (*H7a*), but positively
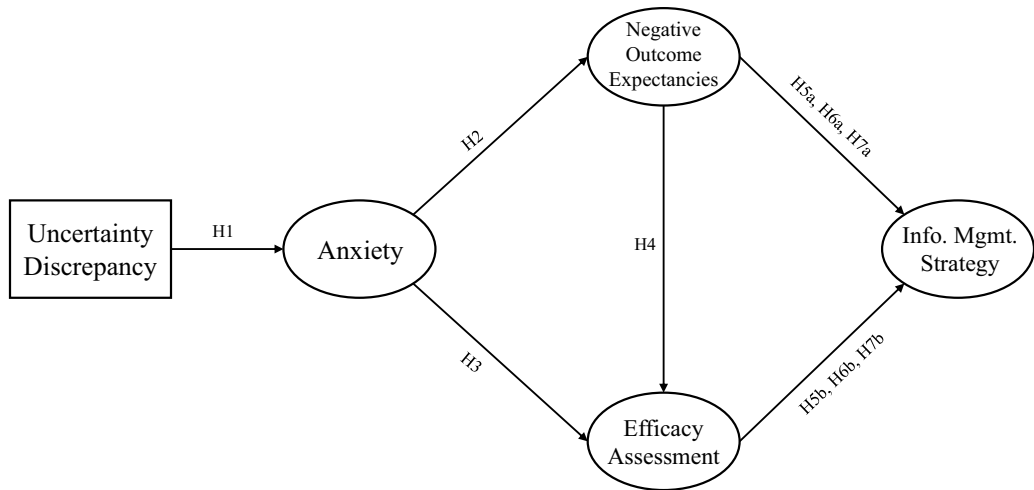
Figure 1. Predicted model.

associated with information avoidance (*H6a*). Finally, we expect efficacy assessments are positively associated with information seeking (*H5b*) and support seeking (*H7b*), but negatively associated with information avoidance (*H6b*).

Methods

We conducted a nationwide, online survey of adult adopted individuals to assess their uncertainty about GFHH, the anticipated outcomes of seeking information about GFHH, and the uncertainty management strategies they are likely to employ to deal with their uncertainty discrepancy. This study recruited participants through private online support groups for adoptees. Participants were required to be: (a) between the ages of 25 and 50; (b) legally adopted as a minor through domestic or international adoption; (c) not involved in foster care; (d) not adopted by a stepparent, grandparent, or any other relative; (e) have access to an internet connected device; and (f) be fluent in English. This research was approved by a university institutional review board and is a part of a larger study.

Procedures

Moderators of online support groups for adoptees were asked to post recruitment announcements to their members. All interested participants were directed to an online Qualtrics survey. To begin, participants provided demographic information and described the circumstances of their adoption, followed by a series of Likert-type scales designed to measure uncertainty discrepancy, anxiety, outcome expectancies, efficacy assessments, and the extent to which participants utilize information seeking, information avoiding, or support seeking strategies to manage uncertainty about GFHH. Participants received a $10 gift card to Amazon.com for completing the survey.

Participants

The sample consisted of 154 individuals (40 males, 113 females, 1 intersex). Participants ranged from 25 to 50 years of age ($M = 33.72$, $SD = 7.18$). The participants ethnically identified as 55.8% Caucasian/White, 29.2% Asian, 9.1% African American, 7.8% Hispanic, 2.6% Native American, 1.9% Indian, and 1.3% Other. Participants reported being adopted between the ages of 0–6 months (49.4%), 6–

12 months (9.1%), 1–5 years (38.3%), and after 5 years of age (3.2%). Among the participants, 27.3% stated they have contact with their birth mother, while 19.5% stated they have contact with their birth father.

Most participants (60.4%) reported that their adoptive parents are married, 12.3% widowed, 11.7% divorced, 7.1% single, 4.5% in a civil union, and 4.0% engaged to be married. A majority (58.4%) also reported they have siblings in their adoptive family, with 77% having other adopted siblings and 44.4% having siblings biologically related to adoptive parents. Some participants (42.2%) were aware that they have biological siblings. A small percentage of these participants reported their biological sibling was adopted by the same family (0.06%) or by a different family (0.06%), but most known biological siblings (75%) were living with at least one biological parent. In addition, 51.4% of participants were the same race as their adoptive parents, while 48.6% were adopted by parents of a different race.

Measures

All scales were subject to confirmatory factor analysis to establish internal validity and unidimensionality of each measure (Kline, 2011). All scales provided an adequate fit to the data, as determined by the χ^2 value, Comparative Fit Index (CFI) > .95, and Root Mean Squared Error of Approximation (RMSEA) < .08 (Kline, 2011). Composites for each variable were created by computing the average of the retained items from each scale.

Uncertainty discrepancy

Uncertainty discrepancy was measured using Rauscher and Hesse's (2014) uncertainty discrepancy about family health history scale, with items modified to reflect GFHH. To measure the uncertainty discrepancy, an index was created calculating the difference between participants' responses on two items: "How certain do you want to be about your genetic family health history?" and "How certain are you about your genetic family health history?" Participants responded to each item on a 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*) and difference scores with positive values reflecting more uncertainty than is desired and negative values reflected less uncertainty than is desired (M = 1.62 SD = 2.06).

Anxiety

Consistent with previous tests of TMIM, *anxiety* was measured using Dillard and Peck's (2001), pp. 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*) that measures discrete emotions. Participants were instructed to reflect on how much or how little they feel anxiety when they think about their perceived uncertainty about GFHH information. Three items measured *anxiety*: "fearful," "scared," and "afraid" (χ^2 = 24.85, df = 13; CFI = .96; RMSEA = .08; M = 3.03; SD = 1.32; α = 0.77).

Outcome expectancy

We developed items to measure the extent to which adopted individuals expect positive or negative outcomes when learning about their GFHH. The scale contains 10 items on a 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*) Items include (a) "Asking about my genetic family health history would make me uncomfortable," (b) "Finding out about my GFHH would reveal information I can't handle," (c) "Talking about my GFHH would be challenging for me," (d) "Asking about my GFHH would be embarrassing for me," (e) "Finding out about my GFHH would hurt my relationship with my adoptive family," (f) "Talking about my GFHH would be enlightening for me (reverse coded)," (g) "Finding out about my GFHH would help me understand myself (reverse coded)," (h) Finding out about my GFHH would help me plan for my future (reverse coded)," (i) "Asking about my GFHH would reveal positive information about me (reverse coded)," and (j) "Talking about my GFHH would help my relationship with my adoptive family (reverse coded)" (χ^2 = 37.29, df = 26; CFI = .97; RMSEA = .06; M = 2.72; SD = .81; α = 0.73).

Efficacy assessments

We used Fowler and Afifi's (2011) measure of communication efficacy, coping efficacy, and target efficacy, with items revised to reflect the GFHH context. All items were measured on a 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*). *Communication efficacy* was measured with four items (e.g., "I know what I need to say to successfully find information about my GFHH;" χ^2 = 27.74, df = 19, CFI = .98, RMSEA = .06, M = 3.45; SD = 1.25; α = 0.79). *Coping efficacy* was measured with four items (e.g., "I can cope with whatever information I find about my GFHH;" χ^2 = 31.232, df = 19, CFI = .96, RMSEA = .07, M = 4.60; SD = 1.06; α = 0.73). To assess *target efficacy*, participants were first asked to identify who they are likely to approach about their GFHH with response choices of (a) my adoptive parents, (b) my biological parents, (c) my healthcare provider, and (d) other. Participants were asked to reflect on the capability of their chosen person when responding to items measuring target efficacy. Four items were used to measure target efficacy (e.g., "I believe they will be forthcoming about my GFHH if they have any knowledge;" χ^2 = 13.92, df = 13, CFI = .99, RMSEA = .02, M = 4.19; SD = 1.22; α = 0.75).

Uncertainty management strategies

To measure the uncertainty management strategies, a modified version of Leustek's (2018) scale was used to assess information seeking, information avoidance, and support seeking. Participants were asked to identify the person they were most likely to approach when attempting to manage their uncertainty about GFHH. The majority of participants indicated that they would target an adoptive parent (34.5%), the birth mother (20.4%), their healthcare provider (13.4%), the birth father (7.7%), or other sources (e.g., other family members, genetic tests, adoption agencies; 23.2%). Individuals were instructed to indicate which uncertainty management behaviors they anticipated using to address their uncertainty discrepancy about GFHH. All items were measured on a 6-point scale (1 = *never*, 6 = *a great deal*). Five items measured *information seeking* (e.g., "Try my best to increase my knowledge and understanding about my uncertainty;" χ^2 = 23.80, df = 19; CFI = .98; RMSEA = .04; M = 3.61; SD = 1.08; α = 0.68). *Information avoidance* was also measured with five items (e.g., "Stay away from things that remind me that I do not know my GFHH;" χ^2 = 22.30, df = 19; CFI = .99; RMSEA = .04; M = 2.76; SD = 1.18; α = 0.80). Finally, *support seeking* was measured with five items (e.g., "Seek consolation from my adoptive family," χ^2 = 18.60, df = 13; CFI = .97; RMSEA = .06; M = 3.26; SD = 1.13; α = 0.76).

Results

Preliminary analyses

As a starting point, we ran bivariate correlations among all variables (see, Table 1). Results indicated that uncertainty discrepancy was positively associated with anxiety, coping efficacy, and information seeking, and negatively associated with negative outcome expectancies, communication efficacy, and information avoidance. Anxiety was negatively associated with all types of efficacy and information

Table 1. Bivariate correlations.

	V1	V2	V3	V4	V5	V6	V7	V8	V9
V1: Uncertainty Discrepancy	–								
V2: Anxiety	.22**	–							
V3: Negative Outcome Expectancies	−.35***	.11	–						
V4: Communication Efficacy	−.27***	−.22**	−.04	–					
V5: Coping Efficacy	.17*	−.20**	−.45***	.11	–				
V6: Target Efficacy	−.05	−.24**	−.25**	.40***	.21**	–			
V7: Information Seeking	.17*	.14	−.18*	.18*	.09	.11	–		
V8: Information Avoidance	−.26**	−.17*	.23**	.09	−.17*	−.03	.23**	–	
V9: Support Seeking	−.13	.13	.11	.11	−.11	.05	.56***	.14	–

Note: * p < .05. ** p < .01. *** p < .001.

avoidance. Negative outcome expectancies were positively associated with information avoidance, and negatively associated with coping and target efficacy. Communication efficacy was positively associated with target efficacy and information seeking. Coping efficacy was positively associated with target efficacy, and negatively associated with information avoidance. Finally, all three information management strategies were interrelated.

Next, we conducted independent samples t-tests to compare means on all of the variables based on gender, contact with birth mother, contact with birth father, and transracial adoption. Males reported a higher mean for information avoidance (M = 3.72, SD = 1.04) and support seeking (M = 3.69, SD = .85) than females (M = 3.77, SD = 1.29; M = 3.12, SD = 1.18); $t_{(140)}$ = 2.48, p = .014; $t_{(140)}$ = 2.74, p = .007. In addition, individuals who had contact with their birth mother had a higher mean for communication efficacy (M = 3.90, SD = 1.33) and coping efficacy (M = 4.89, SD = 1.05) than those who did not have contact (M = 3.34, SD = 1.49; M = 4.47, SD = 1.05); $t_{(140)}$ = 2.38, p = .019; $t_{(140)}$ = 2.13, p = .035. Lastly, individuals who had contact with their birth father had a higher mean for target efficacy (M = 4.79, SD = 1.05) and a lower mean for support seeking (M = 2.89, SD = 1.03) than those who did not have contact (M = 4.08, SD = 1.24; M = 3.39, SD = 1.13); $t_{(140)}$ = 2.86, p = .005; $t_{(140)}$ = −2.17, p = .032. There were no significant mean differences on any of the variables for individuals in transracial versus non-transracial adoptions.

Finally, we ran one-way ANOVAs to compare means on the uncertainty management strategies for each potential target. There was a statistically significant difference between groups for information avoidance ($F_{(5, 135)}$ = 4.32, p = .001), such that information avoidance was higher for the first adoptive parent than for birth moms (p = .013) or other (p = .001). There were no mean differences in information avoidance for the other targets. In addition, there were no mean differences between targets for information seeking or support seeking.

Test of hypotheses

Hypotheses were tested using structural equation modeling with maximum likelihood estimation in AMOS 26. All variables in the model, except uncertainty discrepancy, were treated as parcels consisting of a latent variable, measurement error, and random error. The use of parcels provides advantages for model efficiency, estimation stability, improved model fit, and the ability to control for measurement error in the model (Matsunaga, 2008). Measurement error was calculated as $(1 – α)/(σ$; Bollen, 1989). Uncertainty discrepancy was modeled as an observed variable with random error since the difference score constituted a single item measure. In cases where endogenous variables are highly correlated, Weston and Gore (2006) recommend running separate models to remove redundancy and the potential for multicollinearity; thus, separate models were run with each type of information management strategy as the endogenous variable and each type of efficacy was included as predictors in separate models. Model fit was determined by the $χ^2$ value for the model, CFI > .95, and RMSEA < .08 (Kline, 2011).

The first set of models tested associations among the variables predicting information seeking as an uncertainty management strategy (see, Figure 2). The hypothesized model did not initially provide an adequate fit to the data (communication efficacy: $χ^2$ = 38.03, df = 4, CFI = .38, RMSEA = .25; coping efficacy: $χ^2$ = 20.03, df = 4, CFI = .75, RMSEA = .17; target efficacy: $χ^2$ = 25.39, df = 4, CFI = .56, RMSEA = .19). To fit the model, we started by removing the nonsignificant path between efficacy and information seeking. Then, paths were added to the model one at a time based on modification indices provided by AMOS 26, beginning with the path that had the largest index, which indicates a degree of improvement in model fit when added, until the model achieved a satisfactory fit (e.g., Kline, 2011; Weston & Gore, 2006). Two paths were added to all information seeking models, including a direct path between uncertainty discrepancy and negative outcome expectancies, and a direct path between anxiety and information seeking. These modifications resulted in a satisfactory fit for all models (communication efficacy: $χ^2$ = 5.37, df = 3, CFI = .96, RMSEA = .07; coping efficacy: $χ^2$ = 3.43, df = 3, CFI = .99, RMSEA = .03; target efficacy: $χ^2$ = 5.79, df = 3, CFI = .95, RMSEA = .08).
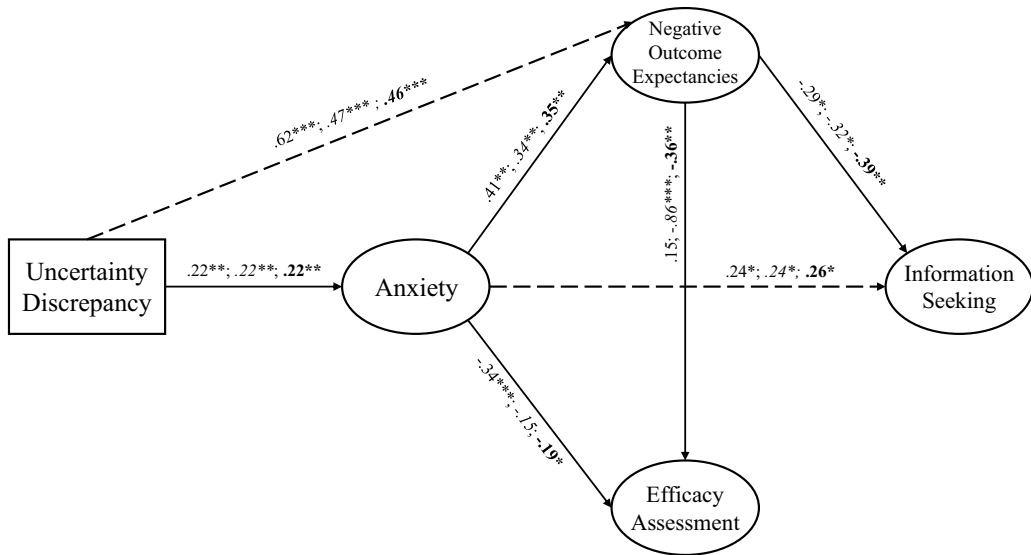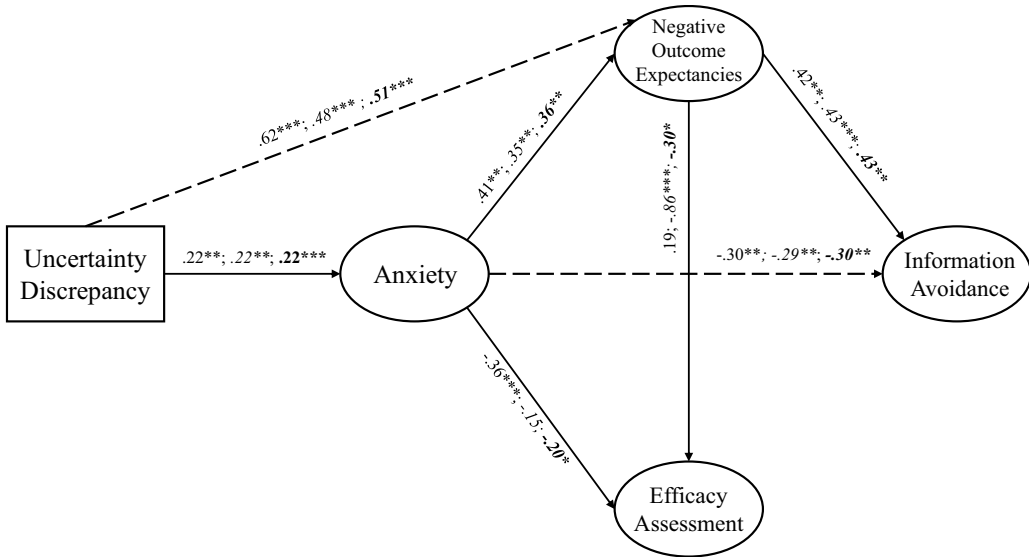
Figure 2. Fitted model for information seeking.
 Note. Values represent standardized path coefficients for each model depending on the type of efficacy assessment entered in the model, with communication efficacy in plain text, *coping efficacy in italics*, and **target efficacy in bold**.* $p < .05$; ** $p < .01$; *** $p < .001$.

Consistent with hypotheses, the level of uncertainty discrepancy about GFHH was positively associated with anxiety (*H1*), which was positively associated with negative outcome expectancies (*H2*) and negatively associated with communication efficacy and target efficacy (*H3*). In addition, negative outcome expectancies were negatively associated with coping efficacy and target efficacy (*H4*). Negative outcome expectancies were negatively associated with information seeking across all models (*H5a*); however, contrary to expectations, none of the efficacy assessments were significantly associated with information seeking and the path was removed (*H5b*). The two paths that were added to the model showed that uncertainty discrepancy shared a direct and positive association with negative outcome expectancies, and anxiety was directly and positively associated with information seeking.

The second set of models tested associations among the variables predicting information avoidance (see, Figure 3). The hypothesized model did not provide an adequate fit to the data (communication efficacy: $\chi^2 = 35.60$, df = 4, CFI = .39, RMSEA = .24; coping efficacy: $\chi^2 = 21.91$, df = 4, CFI = .76, RMSEA = .18; target efficacy: $\chi^2 = 27.78$, df = 4, CFI = .55, RMSEA = .21). Again, the nonsignificant path from efficacy to information avoidance was removed and paths were added to the model one at a time based on modification indices until the model achieved a satisfactory fit. The same paths between uncertainty discrepancy and negative outcome expectancies and between anxiety and information seeking were added to fit this model. These modifications resulted in a satisfactory model fit across all models (communication efficacy: $\chi^2 = 5.29$, df = 3, CFI = .96, RMSEA = .07; coping efficacy: $\chi^2 = 3.01$, df = 3, CFI = 1.00, RMSEA = .00; target efficacy: $\chi^2 = 5.65$, df = 2, CFI = .95, RMSEA = .08).

In the models predicting information avoidance, uncertainty discrepancy was positively associated with anxiety (*H1*), which was positively associated with negative outcome expectancies (*H2*). Anxiety was negatively associated with communication efficacy and target efficacy (*H3*), but not significantly associated with coping efficacy. Negative outcome expectancies were negatively associated with coping efficacy and target efficacy (*H4*), but not significantly associated with communication efficacy. In addition, negative outcome expectancies were positively associated with information avoidance across all models (*H6a*); however, none of the types of efficacy assessments were significantly associated with
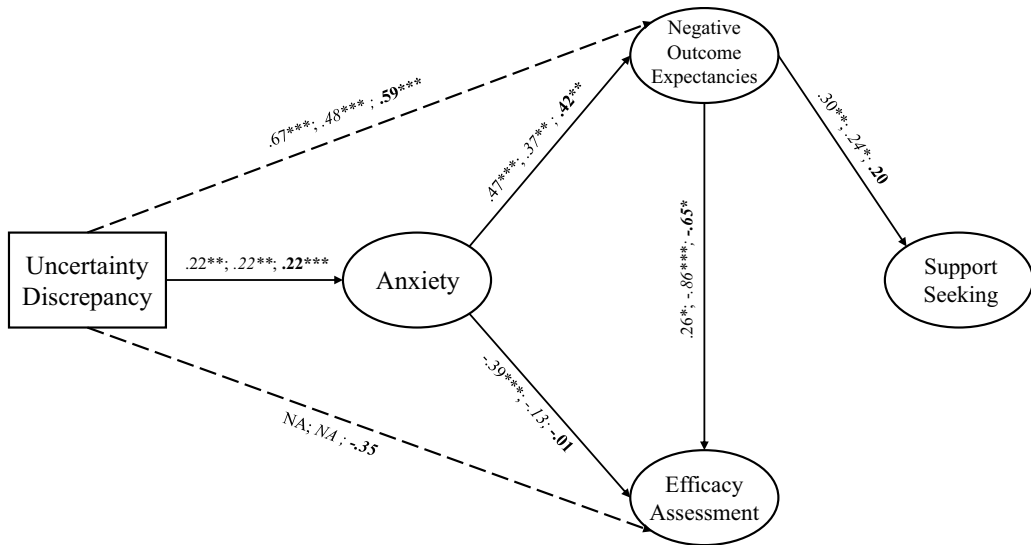
Figure 3. Fitted model for information avoidance.
 Note. Values represent standardized path coefficients for each model depending on the type of efficacy assessment entered in the model, with communication efficacy in plain text, *coping efficacy in italics*, and **target efficacy in bold**.* $p < .05$; ** $p < .01$; *** $p < .001$.

information avoidance (*H6b*). The two added paths showed that uncertainty discrepancy was positively associated with negative outcome expectancies, and anxiety was negatively associated with information avoidance.

The final set of models examined the associations among variables predicting support seeking (see, Figure 4). The hypothesized model did not initially provide an adequate fit to the data in any of the models (communication efficacy: $\chi^2 = 28.71$, df = 4, CFI = .45, RMSEA = .21; coping efficacy: $\chi^2 = 21.61$, df = 4, CFI = .72, RMSEA = .18; target efficacy: $\chi^2 = 22.03$, df = 4, CFI = .60, RMSEA = .18). Again, the nonsignificant path from efficacy to the outcome was removed, followed by the addition of paths suggested by the modification indices. One direct path was added to all models, between uncertainty discrepancy and negative outcome expectancies. For the model with target efficacy, an additional path was added between uncertainty discrepancy and target efficacy to achieve satisfactory model fit (communication efficacy: $\chi^2 = 6.52$, df = 4, CFI = .95, RMSEA = .07; coping efficacy: $\chi^2 = 5.12$, df = 4, CFI = .98, RMSEA = .05; target efficacy: $\chi^2 = 5.23$, df = 3, CFI = .95, RMSEA = .07).

In the models predicting support seeking, uncertainty discrepancy was positively associated with anxiety (*H1*). Anxiety was positively associated with negative outcome expectancies (*H2*), but it was only significantly and negatively associated with communication efficacy (*H3*), whereas the associations with coping and target efficacy were nonsignificant. Negative outcome expectancies were positively associated with all types of efficacy assessments (*H4*), and positively associated with support seeking in the models with communication and coping efficacy, but not target efficacy (*H7a*). In addition, none of the efficacy assessments were significantly associated with support seeking, so *H7b* was not supported. In addition to the hypothesized paths, the level of uncertainty discrepancy was positively associated with negative outcome expectancies across all models. Second, the added path between uncertainty discrepancy and target efficacy was necessary to fit the model, but the effect was nonsignificant.

Figure 4. Fitted model for support seeking.
 Note. Values represent standardized path coefficients for each model depending on the type of efficacy assessment entered in the model, with communication efficacy in plain text, *coping efficacy in italics*, and **target efficacy in bold**.* $p < .05$; ** $p < .01$; *** $p < .001$.

Discussion

This study applied TMIM (Afifi, 2010) to identify factors that shape adopted individuals' selection of uncertainty management strategies with regard to GFHH. The results indicate that adopted individuals' uncertainty discrepancy about GFHH is associated with increased anxiety and negative outcome expectancies, which in turn predict efficacy assessments. In addition, negative outcome expectancies are negatively associated with seeking information and support and positively associated with information avoidance; however, efficacy assessments were significant predictors of uncertainty management strategies around GFHH. Theoretically, these findings extend TMIM by considering support seeking as a potential strategy for managing uncertainty in contexts where information is hard to access, and by calling into question the role of efficacy assessments in adopted individuals' encounters with GFHH. Pragmatically, the results of this study illuminate important considerations for adopted individuals who desire information about their GFHH and the pathways for managing uncertainty in this context.

Implications for advancing the theory of motivated information management

This study offers important implications for advancing the theory of motivated information management. First, this study applies TMIM to a unique context where uncertainty, anxiety, and information management share complex associations. Although the theory has been applied previously to examine people's motivations for seeking information about their GFHH (e.g., Hovick, 2014; Kuang & Gettings, 2020; Rauscher & Hesse, 2014), this study is the first to apply the theory to adopted individuals where uncertainty about their family of origin is heightened and the availability of information could be limited. Although this study examines the extremes of uncertainty and information management in a unique population, the tenets of TMIM were supported for the most part. Thus, this study helps to confirm the theory's assumptions and demonstrate its utility across a wide variety of contexts.

One aspect of TMIM that was not well supported in this investigation is the assumption that efficacy assessments are influential in shaping uncertainty management practices (Afifi, 2010). Although efficacy is assumed to be a particularly salient issue for adopted individuals, and it was diminished under conditions of anxiety and negative outcome expectancies, none of the types of efficacy were significant predictors of the uncertainty management strategies. One possible explanation for the lack of significant effects is related to the context of adoption and GFHH. Perhaps adopted individuals view information about their GFHH as beyond their locus of control (Strong et al., 2017). If one's birth parents are unknown, then the adoptee's *ability* to seek information is not a relevant consideration. When there is no possible way to gain access to GFHH information, adopted individuals should have no efficacy whatsoever in their ability to seek it. Coping efficacy is also rendered moot because there is no need to cope with information that cannot be had. Therefore, efficacy judgments may not be a salient consideration for adopted individuals if GFHH is considered to be beyond their reach. Although genetic testing is a viable way for adoptees to learn about their genetic health risks (May et al., 2015), it does not provide the same type of information about the hereditary roots of those conditions. For adopted individuals, this hereditary information may be even more desirable than the knowledge of potential health risks because it provides insight into a family that is unknown to them. Thus, efficacy judgments may not only reflect ability to obtain health information, but more complex judgments of one's ability to handle personal elements of their genetic family history.

Another theoretical contribution of this research is the addition of social support seeking as an alternative strategy for uncertainty management, especially in situations where access to the sought-after information is restricted. Although support seeking has not been investigated in the context of the theory, TMIM has discussed the benefits of cognitive reappraisal for helping individuals reframe their uncertainty discrepancy so that experienced and desired levels of certainty are more aligned (Afifi & Weiner, 2004). Notably, supportive communication can facilitate cognitive reappraisal (Holmstrom, 2015) and help to buffer stress and manage uncertainty (e.g., Raffaeli et al., 2013); therefore, receiving social support can help adopted individuals manage their uncertainty and cope with their emotions in the absence of information about their genetic roots. Thus, we consider social support to be a valuable addition to the uncertainty management toolkit in the context of adoption and GFHH.

Translational opportunities for uncertainty management about GFHH

The results of this study offer translational opportunities for helping adopted individuals manage their uncertainty about GFHH. For adoptees who desire information about their hereditary health risks, there are pathways and opportunities for information management. Importantly, adopted individuals who were in reunion with their birth mother and/or father reported increased efficacy to seek information about GFHH and a lower need for social support in this context. These findings suggest that establishing contact with one's birth parents can be an important factor for mitigating uncertainty about GFHH. For individuals who are not in reunion with their birth parent(s), however, the development of various genetic testing options has allowed adopted individuals to discover useful information about their GFHH (May et al., 2015). Many adoptees have shown interest in seeking genetic testing and point to the acquisition of health information as their main motivation for testing (Baptista et al., 2016). Adoptees have a strong desire to gain heath related heritage information (Grotevant et al., 2013), and lack of access to hereditary information creates health disparities that can be somewhat mitigated through genetic testing (May et al., 2016a; 2016b). Notably, a majority of participants indicated that they would approach adoptive parents to aid in uncertainty management about GFHH. Thus, establishing conduits through which adoptive parents can access information about the birth family and genetic health risks would arm them with the tools necessary to address their adopted child's GFHH information needs when they arise.

Interestingly, preliminary analyses showed few mean differences in the uncertainty management strategies that were preferred for various information targets. The only significant difference to emerge was a greater likelihood of information avoidance when targeting an adoptive parent, as compared to birth mothers or other information sources. These findings imply that adopted individuals might be highly cognizant of the potential sensitivities involved in pursuing birth family information from adoptive parents. Adopted individuals might be motivated to avoid birth family conversations with adoptive parents to prevent hurt feelings for their parent or minimize the appearance of disloyalty or lack of gratitude for what the adoptive family has provided. These considerations might be particularly salient in transracial adoptions where the differences between adopted children and their adoptive parents are highly visible and integration of birth family culture may be limited, which can make efforts to understand one's genetic background particularly challenging (Samuels & LaRossa, 2009). Thus, adoptive parents who encourage open communication about the birth family can mitigate discomfort and create an environment where their adopted children are less likely to view conversations about their birth family as taboo (Wrobel et al., 2013).

Adoptive parents often have mixed feelings about exploring whole genome sequencing for their adopted children. Although some parents feel sequencing would answer questions about GFHH and increase awareness of potential health risks, other parents have concerns that the results could compromise their children's autonomy and privacy (Crouch et al., 2015). In addition, some adoptive parents are reluctant for their adopted children to pursue information about their biological family, fearing that learning about the birth family could be up upsetting to the adopted child or undermine their ties to the adoptive family (MacDonald & McSherry, 2013). In light of these concerns, adopted individuals who seek genetic testing to learn about their hereditary health risks should reflect on the expected outcomes of the testing and their efficacy to cope with potentially distressing results before moving forward. Nevertheless, advancements in genetic testing help arm adoptees with unique opportunities for information seeking that allow for some control over when and how to find pertinent information (Strong et al., 2017). In situations where adoptees are prevented from knowing the identity of their birth family, genetic testing may be the only available means for seeking information and reducing uncertainty about hereditary health risks.

This research also has practical implications for healthcare providers and counselors who work with adopted children. Prior research shows that the most common barriers to seeking GFHH information are uncertainty (e.g., Baptiste-Roberts et al., 2007) and negative emotions (e.g., McAllister et al., 2007); thus, it is important for healthcare providers to understand how uncertainty and affect are interwoven in this context to shape motivations for engaging with information about GFHH. One important recognition for these healthcare professionals is that adopted individuals may not have a desire to reduce uncertainty about their GFHH. Clinicians tend to have less empathy and sympathy for individuals who avoid receiving information about their genetic health and tend to perceive them as less competent, moral, and normative compared to those who seek hereditary health information (Heck & Meyer, 2019), but our findings suggest that adoptees' intentions to seek this information for themselves can be impeded by factors beyond their control. Clinicians should realize that adopted individuals may want to avoid GFHH information if they expect to receive distressing information, lack confidence in their ability to obtain the information, or prefer to remain in the dark about their potential health risks. This knowledge will allow healthcare providers to recommend the best possible options for information management tailored to individual needs and circumstances.

Finally, these results point to the need for sensitivity when treating adopted individuals. Adoption decreases the availability of pertinent health history information when adoptees are not in contact with birth parents or lack the necessary closeness to allow for the sharing of private health information (Ashida et al., 2013). In these situations, social support can be beneficial for helping adopted individuals reappraise uncertainty around their hereditary health information. Whether social support is provided by clinicians, the adoptive family, friends, or other adoptees, supportive conversations can

help adopted individuals to view their uncertainty about GFHH in a new light and embrace the ambiguity inherent in their situation (Holmstrom, 2015). Thus, adopted individuals may choose to seek comfort instead of pursuing information that may be unavailable, unreliable, or undesirable.

Limitations and future directions

Our study is not without some limitations. First, the cross-sectional nature of our data limits our ability to show how uncertainty and anxiety about GFHH may change over time. Moreover, it limits our ability to document the actual uncertainty management strategies that adopted individuals ultimately employed, so we can only speak to behavioral intention as opposed to actual action. Future research should collect longitudinal data that explores the different uncertainty management strategies that are employed over time and their relative impact on people's uncertainty about GFHH. Monitoring these processes over time will provide better insight into the ways adopted individuals may use different strategies in combination or in sequence to achieve a desired level of certainty about their hereditary health risks.

Another limitation is that our sample was predominantly white and female, and relatively small, which limits our ability to generalize these findings to more diverse populations and males. Especially given the prevalence of international and interracial adoptions (United States Department of State – Bureau of Consular Affairs, 2019), and the propensity of some races to have higher risk for hereditary disease (e.g., Rebbeck, 2017), understanding how racial minorities manage uncertainty about GFHH would be an important extension of this work. Similarly, the sample for this study was restricted to adopted individuals who were not involved in foster care nor adopted by other family relatives. Given that these family contexts may provide more accessibility to hereditary health information, future research should consider how different adoptive structures shape people's motivation and ability to seek information about GFHH, as increased accessibility might alter preferred information management strategies.

Conclusion

Although adopted individuals may find themselves at a disadvantage when it comes to accessing their GFHH, this study demonstrates that there are mechanisms that can help adoptees cope with uncertainty about their birth family and their hereditary health risks. This study applies TMIM to assess the factors that influence uncertainty management strategies for adoptees who desire information about their GFHH and extends the theory to add support seeking as a possible strategy that adoptees can use to cope with uncertainty when information about their birth family and GFHH are unavailable. The results of this study point to important translational implications for healthcare providers, clinicians, and adoptive families who wish to provide sensitive and supportive care for adopted individuals regarding their health and wellbeing. Despite facing deficits of information about their GFHH, adopted individuals can manage their uncertainty through a variety of alternative mechanisms.

Disclosure statement

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