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RESEARCH PAPER

A Longitudinal Examination of Locus-of-Hope, Need Satisfaction and Life Satisfaction Through a Serial Mediation Model

Ezgi Coban-Tosyali[1,2] · **Özlem Bozo**[1]

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Abstract
Hope, as positive motivational cognition dependent on pathways and agency thinking, is a powerful predictor of life satisfaction. However, the original theory was criticized for over-relying on individual efforts, leading to the extension of the theory by including external agents (family, peers and spirituality) as sources of hope—a concept known as external locus-of-hope. Although hope was identified as a source of psychological strength, limited data exists on how locus-of-hope, especially external sources, is related to well-being. Self-Determination Theory (SDT) is a promising framework for further investigation of the role of external agents -in addition to the role of personal resources- in goal-achievement. In the goal-attainment process, hope theory addresses "how" people pursue goals rather than "why" goals are pursued, which is the subject of SDT. The present study, by integrating these two perspectives, aims to investigate the relations among locus-of-hope, need satisfaction, and well-being. The longitudinal relations among internal locus-of-hope, external locus-of-hope (family, peers and spirituality), need satisfaction, and life satisfaction were examined with a sample of 247 students from Türkiye (M_{age}=21.17). The findings indicate indirect effects of T1 family and peers locus-of-hope dimensions on T3 life satisfaction through serial mediation of T1 internal locus-of-hope and T2 need satisfaction. These findings underscore the importance of social agents in hopeful thinking and provide empirical support for integrating hope theory with psychological need satisfaction in understanding life satisfaction.

Keywords Hope · Locus-of-hope · Psychological need satisfaction · Life satisfaction · Longitudinal analysis

This study is part of Ezgi Coban-Tosyali's doctoral dissertation, supervised by Özlem Bozo at Middle East Technical University.

✉ Ezgi Coban-Tosyali
ezgi.coban@ibu.edu.tr

Özlem Bozo
bozo@metu.edu.tr

[1] Department of Psychology, Middle East Technical University, 06800 Ankara, Turkey

[2] Department of Psychology, Bolu Abant Izzet Baysal University, Bolu, Turkey

Hope plays a crucial role in understanding well-being across diverse age groups (Pleeging et al., 2021). Dispositional hope was found to be one of the most powerful predictors of life satisfaction in younger and older adults (O'Sullivan, 2011; Oliver et al., 2017) as well as in children (Munoz et al., 2019) over other constructs such as optimism and self-efficacy (Munoz et al., 2017). According to Snyder (1994), hope arises when people can both create viable routes to their goals (pathways) and stay motivated to follow these routes (agency). Snyder's theory of hope has been criticized because of its overreliance on individual efforts (Bernardo, 2010). To respond to that criticism, Bernardo (2010) extended hope theory by including external agents (family, peers and spirituality) into the goal-attainment process, a concept known as external locus-of-hope.

Because the locus-of-hope framework is relatively new in the literature, the mechanism explaining how hope dimensions are beneficial for well-being has not been fully examined. Self-Determination Theory (SDT) can explain how a hopeful orientation assisted by external agents contributes to well-being. SDT offers a meaningful way to explore the role of hope, particularly how external and internal sources of hope contribute to the satisfaction of basic psychological needs, which in turn promotes well-being. By integrating these perspectives, the present study aimed to investigate the relations among locus-of-hope, need satisfaction, and well-being.

1 Locus-of-Hope Theory

Snyder's Hope Theory defined hope as a positive motivational cognition that depends on a sense of successful pathways thinking and agency thinking (Snyder et al., 2002). The cognitive dimension, pathways thinking, reflects an individual's ability to generate multiple strategies to navigate challenges and progress toward goal attainment (Snyder, 2002). The motivational dimension, agency thinking, represents the determination and mental energy required to initiate and sustain effort along these pathways (Snyder, 2002). These components work reciprocally, thus, strong agency enhances persistence in identifying and utilizing pathways, and availability of pathways strengthens motivation (Cheavens et al., 2006; Snyder et al., 2002). For this reason, hopeful individuals do not only see alternative routes to their goals but also maintain the resilience to overcome obstacles, ensuring sustained progress even in the face of difficulties (Snyder, 1994, 2002).

At that point, hope and self-efficacy may seem overlapping, however they differ in terms of goal specificity and the nature of expectancies. While self-efficacy is typically tied to situational-specific goals and the assessment of one's ability to complete a particular task, hope theory encompasses a broader range of goals—ranging from situational to enduring and cross-sectional (Bandura, 1982; Snyder, 2002). Furthermore, self-efficacy theory primarily focuses on efficacy expectancies (the belief in one's ability to perform a behavior), whereas hope theory places equal emphasis on both agency and pathways. This distinction allows hope to act as a stronger predictor of generalized outcomes like life satisfaction and well-being (Gallagher et al., 2020; Magaletta & Oliver, 1999). Importantly, self-efficacy has been criticized for overlooking the impact of external factors, such as luck, spiritual beliefs, and social support, on goal-directed behavior. By integrating both internal determination and the capacity to identify routes, hope theory provides a more holistic framework (Snyder, 2002).

Hope depends on individual efforts to practice skills to overcome adversity; however, the availability of social support helps to develop those skills required to come up with alternative solutions (Kemer & Atik, 2012; Li & Yin, 2015). Snyder et al. (1997) emphasized that the social environment occupies a crucial place in nurturing hopeful thinking. The accumulated experiences gained through social networks can encourage one to find new pathways and hold motivation to reach desired goals. In that sense, Bernardo (2010) proposed an extension to the theory of hope by introducing external agents based on the criticism suggesting that Snyder's theory of hope focuses solely on individual resources. According to Bernardo (2010), the original scale of Snyder et al. (1991) represents the internal dimension of locus-of-hope. However, the extended theory of hope (Bernardo, 2010) pointed out four dimensions, including internal locus-of-hope (e.g., I meet the goals that I set for myself), external-family locus-of-hope (e.g., My parents have lots of ways of helping me attain my goals), external-peers locus-of-hope (e.g., I have been able to meet my goals because of my friends' help), and external-spiritual locus-of-hope (e.g., God has many different ways of letting me attain my goals). Thus, locus-of-hope framework provided a more holistic view of how hope can originate from internal and external resources, and how each of them contribute to goal attainment.

The limited number of studies investigating locus-of-hope presented compelling evidence regarding the crucial contribution of family, peers and spirituality to goal pursuit along with internal locus-of-hope (Bernardo, 2010; Dargan et al., 2021; Du et al., 2015). For example, Munoz et al. (2019) showed the relative contribution of the external locus-of-hope by suggesting that external locus-of-hope anchored in parents predicts internal hope, which in turn predicts higher levels of life satisfaction in children. In a similar vein, many studies suggested that secure attachment and perceived social support from family and peers provide a supportive environment to enhance the development of internal hopeful thinking (Kemer & Atik, 2012; Li & Yin, 2015; Sharif et al., 2021; Shorey et al., 2007). Thus, when people engage in goal pursuit, they can rely on the resources of external agents to generate alternative plans (Bernardo, 2010). In that sense, it is worth investigating the unique contributions of external agents -family, peers, and spirituality- to internal hope.

2 Locus-of-Hope and Self-Determination Theory in Well-being Studies

Until recently the association between hope and various outcomes has received much attention, but there is a lack of research focusing on the underlying processes, especially on the role of a relatively new concept, locus-of-hope (Garcia & Sison, 2013). Thus, possible antecedents of internal locus-of-hope and mediating variables between hope dimensions and its outcomes are likely to become important lines of research.

Hope was introduced as a source of psychological strength. However, only a few researchers tried to explicate how hopeful thinking flourishes and leads to well-being. Self-Determination Theory (SDT; Deci & Ryan, 2000) is a promising model to investigate how internal locus-of-hope is nurtured by anchoring hope in external agents in the pursuit of desired goals. Given that hope theory and SDT both assert that humans are intrinsically goal-directed with inherent growth tendencies (Deci & Ryan, 2000; Snyder, 1994), exploring locus-of-hope through need satisfaction offers a way to fill a gap in the literature and deepen our understanding of well-being.

In the SDT framework, autonomy, competency and relatedness are humans' basic needs to be fulfilled (Deci & Ryan, 2000), and the processes that allow meeting these needs enable goal-directed behaviors, higher intrinsic motivation, positive functioning and well-being (Deci & Ryan, 2000; La Guardia et al., 2000; Patrick et al., 2007; Reis et al., 2000). Since these three psychological needs are positively correlated, the satisfaction of all needs is essential to maintain overall psychological development (Deci & Ryan, 2014). Despite the critical importance of these needs, there are a limited number of studies investigating the interplay between hope and psychological need satisfaction. Cihangir-Cankaya and Denizli (2020) investigated the role of hope, secure attachment and need satisfaction in predicting happiness using a sample of Turkish university students. The analyses revealed positive correlations of secure attachment and satisfaction of autonomy, competence and relatedness with higher levels of internal hope, and all of these variables were significant predictors of happiness. In their longitudinal study, Su et al. (2023) showed that hope and need satisfaction are reciprocally related to each other. They also reported that hope indirectly predicts depressive symptoms through need satisfaction, but not vice versa. Their results indicated how hope contributes to need satisfaction in the context of depressive symptoms. Based on these findings, including longitudinal evidence, it can be stated that hope is a stable source of strength that would contribute to the development of need satisfaction in the goal-attainment process.

The need for autonomy represents a volitional course of action and a sense of personal choice (Deci & Ryan, 2014). However, autonomy is often interchangeably used with independence (Patrick et al., 2007). SDT argues that autonomy does not refer to independence and that the importance of relying on others is underestimated. From SDT perspective, autonomy is a desire to engage in self-initiated actions with personal will (Deci & Ryan, 2000). The need for autonomy is satisfied when individuals have opportunities for their choice and to the extent that their efforts are acknowledged and supported (Cook & Artino, 2016). In that way, the satisfaction of autonomy increases intrinsic motivation, which in turn, leads to positive outcomes. In other words, diminished autonomy minimizes intrinsic motivation and leads to negative outcomes (Deci & Ryan, 2000). Further to that, internal locus-of-hope might be related to the development of autonomy. Cihangir-Cankaya and Denizli (2020) found a positive correlation between autonomy and hope in predicting happiness. Similarly, Wandeler et al. (2011) showed a positive relation between hope and autonomy need satisfaction. Internal locus-of-hope, which helps individuals to come up with their own solutions and stay motivated in achieving their goals, may foster an environment that supports autonomous motivation. Thus, the locus-of-hope anchored in personal resources exerts a certain degree of control that promotes the experience of autonomy.

The need for competence reflects the desire to make an impression by effectively performing a behavior (Deci & Ryan, 2000). Getting feedback regarding one's ability to attain a goal encourages the experience of competence (Cook & Artino, 2016). At this point, positive feedback promoting one's self-efficacy enhances competence, and thus, promotes intrinsic motivation (Koka & Hein, 2003; Ryan & Deci, 2009). Internal locus-of-hope may enhance the sense of control over the environment by fostering self-efficacy in achieving goals. Using external support to develop positive thinking can potentially enhance the experience of competence. People who hold higher levels of hopeful thoughts are likely to feel competent in their skills and are able to generate pathways and sustain their motivation to achieve their goals. In that way, the sense of internal locus-of-hope presents an optimal cognitive

level for the nurturance of competence experiences. Supporting this argument, Wandeler and Bundick (2011) demonstrated a reciprocal association between hope and competence at three time-points over a year. Cross-lagged analysis results showed that participants' initial reports of competence predicted hope levels after six months, which in turn, predicted the latest competence scores (Wandeler & Bundick, 2011). This means that hopeful people feel more competent and intrinsically motivated to pursue goals; and thus, are more likely to achieve the desired goal in various aspects of their lives (Lyubomirsky et al., 2005).

The need for relatedness is defined as the desire to feel valued by others and be in supportive relationships (Munoz & Ramirez, 2015). Individuals are more likely to be intrinsically motivated where they feel a sense of belonging (Deci & Ryan, 2000). Relying on external sources to promote internal hope fosters a positive environment that underscores the value of supportive relationships in pursuing goals (Markus & Kitayama, 2003). Therefore, internal hope relying on the supportive environment generated by external agents might account for a nurturing environment for the satisfaction of the need for relatedness. Wandeler and Bundick (2011) tested potential long-term effects of internal locus-of-hope on relatedness satisfaction. They reported that the results were not statistically significant due to a small sample size. However, they also stated that the observed effect size was meaningful, indicating that internal locus-of-hope could still play a significant role in relatedness.

To summarize, the factors for optimal motivation to achieve goals and enhance well-being rest upon personal resources that promote the satisfaction of basic psychological needs (Ryan & Deci, 2009). Environmental conditions that fulfill psychological needs enable individuals to achieve goal-directed activity, motivation, positive functioning, and well-being (Milyavskaya & Koestner, 2011; Patrick et al., 2007; Reis et al., 2000; Ryan & Deci, 2000). To gain a comprehensive understanding of goal-directed behavior and well-being, it is crucial to address the relations of internal and external locus-of-hope dimensions. Thus, understanding how individuals with high levels of hope interact positively with their environment and influence it to facilitate need satisfaction offers valuable insight into their life satisfaction (Wandeler & Bundick, 2011).

3 The Current Study

The current research aimed to investigate the interplay among internal locus-of-hope, external locus-of-hope dimensions and psychological need satisfaction in predicting life satisfaction. To understand how these factors relate to one another over time, a longitudinal mediation model was employed. The examination of relationships across different time points helps to see how locus-of-hope might connect to later need satisfaction, which then relates to life satisfaction. In this model, we hypothesized that T1 external family, peers and spiritual locus-of-hope dimensions would have significant indirect effects on T3 life satisfaction through serial mediation of T1 internal locus-of-hope and T2 need satisfaction.

The use of the longitudinal model provides several contributions to the literature. First, the study offers a clear look at how hope that comes from social sources (family, peers, and spirituality) contributes to life satisfaction. Second, by bringing Locus-of-Hope Theory (how people pursue goals) and Self-Determination Theory (why people pursue goals) together, the study helps to explain the motivation behind the goal success. Longitudinal examination of locus-of-hope in relation to the satisfaction of autonomy, competence and

relatedness needs would allow us to understand the motivation in the goal-attainment process. Third, the longitudinal mechanism between locus-of-hope dimensions and need satisfaction is worth exploring to understand well-being better.

4 Method

In this section, we reported the sample size and power, the information about data exclusions, all procedures and all measures in the study as suggested by Simmons et al. (2012).

5 Participants

A total sample of 247 students (M_{age}=21.17, SD=1.47; n_{female}=204, n_{male}=43) were recruited via convenience sampling. Of the total sample, 10.5% (n=26) were living with their family, 74.5% (n=184) were living in dormitory, 8.1% (n=20) were living with their friends at home, and 6.9% (n=17) were living alone at home. Of the total sample, 18.6% (n=46) indicated their socioeconomic level as low, 79.8% (n=197) indicated as medium, and only 1.6% (n=4) indicated a high socioeconomic status. Majority of the participants reported that they believe in God (85.4%). Among the believers, the rate of those reported that they were Muslims was 79.4% (n=196).

6 Materials

6.1 Locus-of-Hope

Locus-of-hope was assessed with 16-item Short Version of Locus-of-Hope Scale developed by Bernardo et al. (2022). This scale includes four dimensions: internal locus-of-hope, external-family locus-of-hope, external-peers locus-of-hope, and external-spiritual locus-of-hope. The scale was measured using a 4-point Likert scale (1=definitely false, 4=definitely true). The scale was initially translated from English to Turkish by two independent bilingual experts. The negotiated Turkish version was then back-translated into English by another independent bilingual expert who was blind to the original scale items. Discrepancies between the original and back-translated English versions were resolved through discussion among the translators and the research team to ensure semantic and conceptual equivalence. After this process, the final Turkish version was utilized in the current study. In the current study, the Cronbach's alpha coefficients were found at first, second, and third waves respectively as .70, .76, .78 for internal locus-of-hope, .87, .90, .91 for family locus-of-hope, .90, .90, .90 for peer locus-of-hope, and .89, .90, .90 for spiritual locus-of-hope. To test the original 4-factor structure of Locus-of-Hope Scale with a Turkish sample, a confirmatory factor analysis (CFA) through Mplus7 was performed. For the first wave of the data, CFA results indicated good fit for the data, $X^2(98)=154.88$, $p=.000$, CFI=.97, RMSEA=.04, SRMR=.04. The factor loadings were adequate ranging from .50 to .87. For the second wave of the data, CFA results indicated good fit for the data, $X^2(98)=148.82$, $p=.000$, CFI=.98, RMSEA=.04, SRMR=.04. The factor loadings were adequate ranging

from .62 to .89. For the third wave of the data, CFA results indicated good fit for the data, $X^2(98) = 190.25$, $p = .000$, CFI = .96, RMSEA = .06, SRMR = .04. The factor loadings were adequate ranging from .66 to .90.

6.2 Psychological Need Satisfaction

Psychological need satisfaction was measured by Basic Psychological Need Satisfaction Frustration Scale (BSNSFS) which was developed by Chen et al. (2015) to measure experiences of psychological need satisfaction and frustration. The scale consists of 12 items for need satisfaction and 12 items for need frustration rated on a 5−point scale ranging from 1 (not true at all) to 5 (completely true). Higher scores on the scale indicate higher satisfaction and frustration of psychological needs. The Cronbach's alpha coefficients in the original study ranged from .64 to .88 based on the data from four different samples.

BSNSFS was adapted to Turkish by Selvi and Bozo (2020). The Cronbach's alpha coefficients were reported as .82 for autonomy satisfaction, .75 for competence satisfaction, and .88 for relatedness satisfaction. In this study, the Cronbach's alpha coefficients were found at first, second and third waves respectively as .86, .89, .87 for competence, .78, .83, .81 for autonomy, .74, .83, .84 for relatedness. In the present study, only the psychological need satisfaction dimension of BSNSFS was used. Thus, a composite score for need satisfaction was calculated by adding up the scores of relatedness, competence, and autonomy needs satisfaction.

6.3 Life Satisfaction

Life satisfaction was assessed using the Satisfaction with Life Scale developed by Diener et al. (1984). The scale includes five items rated on a 7-point scale (1 = strongly disagree, 7 = strongly agree). The scale adapted to Turkish by Durak et al. (2010) with a Cronbach's alpha coefficient .81. Higher scores on the scale indicate higher life satisfaction. In the present study, the Cronbach's alpha coefficients were .87, .89 and .88 at three time points, respectively.

7 Procedure

The present study was announced to psychology students through in-class announcements. The researchers studied the timetable of psychology courses and went to the lecture halls when these lectures were carried out to provide a brief, oral announcement about the study approximately one week prior to the each data collection point. The questionnaires were prepared online to facilitate the data collection process by using Qualtrics. After giving informed consent, participants completed the questionnaires at three time points with 4-week intervals between the administrations. To minimize attrition, participants were contacted face to face during the lectures and reminded of the date for the second and third administrations. Students received course credit for their participation.

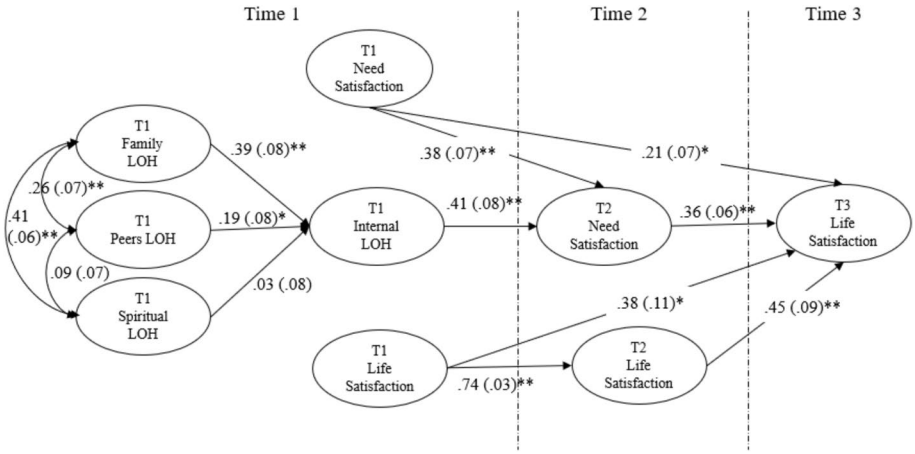


Fig. 1 Longitudinal model of the indirect effects of locus-of-hope dimensions on life satisfaction through internal hope and psychological need satisfaction.*Note 1*. *$p<.01$, **$p<.001$. *Note 2*. Standardized coefficients were reported among latent variables.*Note 3*. All constructs are modeled as latent variables. Indicator variables and error terms are omitted for simplicity.

8 Statistical Model and Data Analysis

The proposed longitudinal model was tested using structural equation modeling in Mplus 7.0. The indirect effects were estimated based on bootstrapping with 5000 samples. This study specified a longitudinal serial mediation model where the relationship between T1 external family, peers and spiritual locus-of-hope and T3 life satisfaction through T1 internal hope and T2 need satisfaction. To implement temporal ordering, the baseline levels of the need satisfaction and life satisfaction were controlled for, by including stability paths (see Fig. 1). All constructs were treated as latent variables. Each latent construct was defined by its respective scale items.

To ensure the statistical adequacy of the longitudinal model, a post-hoc power analysis was conducted. The analysis estimated the power of the model, based on the observed effect sizes and a sample size of 247, to be .86. All participants completed the all measures across the three time points. Therefore, no data exclusions resulting from participant attrition or incomplete data were necessary.

9 Results

Descriptive statistics of and correlations among the study variables for Time 1, Time 2 and Time 3 can be seen in online supplement. For all three waves, internal locus-of-hope was significantly and positively correlated with external locus-of-hope dimensions. Need satisfaction was also positively related to life satisfaction, internal and external locus-of-hope dimensions.

The longitudinal model suggested good fit for the data [$X^2(584)=965.51$, $p<.01$, CFI = .93, RMSEA = .05]. T1 internal locus-of-hope was significantly predicted by T1 family locus-of-hope ($\beta=.39$, $p<.001$) and T1 peers locus-of-hope ($\beta=.19$, $p=.01$). T1 spiri-

tual locus-of-hope did not predict T1 internal locus-of-hope ($\beta = .03$, $p = .74$). T1 internal locus-of-hope significantly predicted T2 need satisfaction ($\beta = .41$, $p < .001$) after controlling for T1 need satisfaction, which in turn, significantly predicted T3 life satisfaction ($\beta = .36$, $p < .001$), after controlling for T1 need satisfaction, T1 life satisfaction and T2 life satisfaction (see Fig. 1).

In the longitudinal model, the indirect effect of T1 family locus-of-hope on T3 life satisfaction through serial mediation of T1 internal locus-of-hope and T2 need satisfaction was significant ($\beta = .06$, $p = .002$, 95% CI [.007, .11]). The indirect effect of T1 peers locus-of-hope on T3 life satisfaction through serial mediation of T1 internal locus-of-hope and T2 need satisfaction was significant ($\beta = .03$, $p = .04$, 95% CI [.01, .07]). The indirect effect of T1 spiritual locus-of-hope on T3 life satisfaction through serial mediation of T1 internal locus-of-hope and T2 need satisfaction was not significant ($\beta = .004$, $p = .74$, 95% CI [-.03, .04]).

10 Discussion

The social environment occupies a crucial place in nurturing hopeful thinking. Hope is based on an interactively derived sense of goal-directed motivation and planning to meet goals; however, the availability of external agents helps to develop those skills required to come up with alternative solutions (Kemer & Atik, 2012; Li & Yin, 2015). The accumulated experiences gained through social networks help one in finding new pathways and holding motivation to reach desired goals (Bernardo, 2010). In that sense, we tested a longitudinal model investigating the indirect effects of external locus-of-hope dimensions on life satisfaction through serial mediation of internal locus-of-hope and need satisfaction. The longitudinal analysis of the mediational model provided a stronger test of the temporal dynamics of the proposed relations, offering insights into the directionality and stability of these effects. More specifically, results indicated significant paths from family and peers locus-of-hope to internal locus-of-hope. These findings align with the concept of "WePower" that refers to the interpersonal context in the expanded model of hope theory (Colla et al., 2022). It represents an individual's ability to draw upon resources and support within their social network. In line with this idea, our results suggested that hopeful thinking derived from family and peers contributes to individuals' internal hope in reaching their goals. In other words, hope is not just a personal trait, but also it grows through relationships. In times when people feel that there is no way to reach the desired goal, people can benefit from alternative pathways and motivation provided by their families and peers (Colla et al., 2022; Munoz et al., 2019).

In the present study, the longitudinal model indicated that T1 internal hope predicts T2 need satisfaction. Internal hope plays a crucial role in fulfilling psychological needs by providing individuals with a sense of purpose. The present study built upon reconceptualization by demonstrating that internal locus-of-hope does not operate in isolation but serves as a key mechanism through which individuals derive psychological need satisfaction, ultimately enhancing life satisfaction. By integrating need satisfaction into the hope and life satisfaction link, this model extended beyond conventional cognitive-based hope theories and aligned with the "WhyPower" notion, emphasizing that hope is not just about setting and achieving goals but also about ensuring goals that are meaningful to individuals (Colla et al., 2022). In that regard, internal hopeful thinking drives individuals to pursue goals that

are meaningful and closely linked to fulfilling their basic psychological needs of autonomy, competence, and relatedness (Cihangir-Cankaya & Denizli, 2020). Hopeful individuals are more likely to perceive themselves as active agents in shaping their experiences, by highlighting their sense of control. Moreover, their ability to generate alternative pathways and persist through difficulties strengthens their perceived competence and increases their confidence in their capacity to achieve meaningful objectives. Internal hope also plays a crucial role in shaping interpersonal dynamics. Those with higher internal hope actively seek out supportive social environments that align with their values, which further contributes to their sense of connection.

Moreover, the longitudinal model showed that T2 need satisfaction predicts T3 life satisfaction. Psychological need satisfaction is a fundamental predictor of life satisfaction, as it directly influences individuals' overall well-being and motivation (Deci & Ryan, 2000). When individuals feel autonomous in their choices, they are more likely to engage in behaviors that align with their long-term goals, thereby promoting sustained life satisfaction (Ng et al., 2012; Williams et al., 2004). Similarly, higher levels of perceived competence contribute to increased confidence, greater persistence in goal-directed efforts, and reduced distress (Reis et al., 2000; Williams et al., 2004). Furthermore, relatedness, the need to feel understood and supported by others, is essential for psychological well-being (Baumeister & Leary, 1995). Strong social connections provide emotional support, enhance adaptive coping mechanisms and reduce stress, all of which ultimately lead to higher levels of life satisfaction (La Guardia et al., 2000). Conversely, when these fundamental needs are thwarted, such as through external control, perceived incompetence, or social isolation, individuals are likely to experience frustration, distress, and diminished well-being (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). Thus, the satisfaction of autonomy, competence, and relatedness needs is not only important for motivation but also a key determinant of overall life satisfaction.

The indirect effects of family locus-of-hope and peers locus-of-hope on life satisfaction through serial mediation of internal locus-of-hope and need satisfaction were established. Specifically, T1 family locus-of-hope and peers locus-of-hope indirectly predicted T3 life satisfaction through serial mediation of T1 internal locus-of-hope and T2 need satisfaction. These findings suggested that while hope derived from family and peers can be internalized and contribute to psychological need satisfaction, spiritual locus-of-hope may function differently in this process. One possible explanation is that although spiritual locus-of-hope fosters a sense of guidance connected to a higher power, it may not necessarily translate into an increased internal locus-of-hope. Spiritual positive thinking often involves faith in divine intervention and reliance on external forces rather than an active belief in one's own agency (Pargament, 2002). Thus, individuals who place their hope in spirituality may not develop a stronger sense of internal hope. In contrast, hope derived from family and peers may involve more direct involvement to one's goal attainment, making it more likely to translate into internal locus-of-hope and psychological need satisfaction in predicting life satisfaction (Kemer & Atik, 2012; Li & Yin, 2015; Munoz et al., 2019; Sharif et al., 2021).

Based on the findings from the longitudinal design, the serial mediational model allowed us to see how external locus-of-hope dimensions contribute to internal hope, which is related to need satisfaction in predicting life satisfaction. The findings of the present study align with prior research. In their longitudinal study, Su et al. (2023) showed that hope indirectly predicts depressive symptoms through need satisfaction, but not vice versa. Our

findings underscore the importance of the interplay between external and internal factors in predicting life satisfaction. By understanding how external positive thinking from family and peers is internalized through internal locus-of-hope and need satisfaction, the present study provided valuable insights into the mechanisms that contribute to well-being.

The present study is not without its limitations. An important limitation of the present study pertains to the generalizability of the findings. Our sample was restricted to a sample of undergraduate university students from Türkiye. This reliance on a specific group limits the extent to which our results can be generalized to the general population or to individuals at different developmental stages (e.g., adolescents or older adults). Furthermore, the sample's relative homogeneity in terms of cultural/religious background and socio-economic status suggests that findings regarding specific variables may not be directly applicable to individuals from diverse cultural, religious or living circumstances. Future studies are suggested to use heterogeneous samples across various countries, age groups and religious backgrounds to establish the robustness of the current findings. Second, the current study relied on self-report questionnaires, which are subject to biases such as social desirability. Future research could benefit from multi-method approaches, including clinician assessments or objective measures, to further strengthen the validity of findings.

Identifying dispositional and contextual indicators of life satisfaction using a longitudinal model may offer several implications. First, the present study highlighted the stability of external locus-of-hope dimensions over time. This stability suggested that these dimensions may serve as consistent resources for individuals in their pursuit of well-being. Second, based on the model tested, it can be stated that dynamic relations of locus-of-hope dimensions and need satisfaction with life satisfaction are not only of theoretical concern but also practically significant as they suggest improvements for well-being. Although there are well-established hope interventions to allow individuals to advance their hopeful thoughts, these interventions mostly focus on internal hope. While the interventions have often overlooked the critical role of external sources of hope, our findings suggest that effective interventions should incorporate these external dimensions to create a more holistic approach to foster hope. Third, the results suggesting a potential pathway from internal locus-of-hope to need satisfaction may help direct the focus of future research toward understanding how internal locus-of-hope can be cultivated and sustained. This finding underscored the importance of internal resources in achieving psychological well-being and suggested that interventions aimed at enhancing internal locus-of-hope could significantly benefit need satisfaction and overall life satisfaction.

Lastly, the present findings suggested that different external sources of hope may have varying levels of influence depending on the individual's life circumstances. For example, for students living away from their families, peers locus-of-hope may be more important, while for those with strong religious beliefs, spiritual locus-of-hope might play a more critical role. Thus, psychologists and other health care specialists may tailor their interventions based on the external sources of hope that are most relevant to the individual, which in turn, would enhance the overall effectiveness of the intervention.

11 Conclusion

This study aimed to explore the relationships between external and internal dimensions of hope, need satisfaction, and life satisfaction in university students using a longitudinal design. Indirect effects of peer and family locus-of-hope were established on life satisfaction through serial mediation of internal hope and need satisfaction. This research contributes to the broader understanding of Locus-of-Hope as a psychological construct in relation to Self-Determination Theory and its practical applications in improving well-being.

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Data Availability The data of this study can be accessed at https://osf.io/cy564/?view_only=14b33f1ef165400b879a8deb46dc1248.

Declarations

Conflict of Interest The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Approval The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Human Research Ethics Committee of Middle East Technical University (protocol code 0517-ODTUİAEK-2022).

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