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Costly inductions as a commitment-selection strategy: Assessing Hazing's relationship with attrition in a college fraternity

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ABSTRACT

Social scientists have often claimed or implied that hazing selects out uncommitted newcomers in voluntary associations. Because groups that engage in hazing are generally secretive about their practices, there has never been a real-world, in situ test of this claim. Using an American social fraternity, we report the first real-world, longitudinal test of hazing's relationship with selective newcomer attrition. Our data are derived from six sets of fraternity inductees who experienced the fraternity's hazing induction process ($N = 126$). Our analyses suggest that experienced hazing severity is a predictor of attrition and that hazing severity differentially predicts the attrition of low-commitment newcomers. However, real-world fraternity inductions (and measurements thereof) are complex in ways that add important caveats to our findings. Our discussion focuses on the best means by which to confirm or disconfirm our results through future replications.

Hazing is the abuse of new or prospective group members. It is a phenomenon notable for its cross-cultural prevalence, historical depth, and modern persistence (e.g., Allan & Madden, 2012; Butt-Thompson, 1908; Cimino, 2016; Durkheim, 1912; Parks, 2021; Tiger, 1984; Van Gennep, 1909; Whitehouse, 1996). Hazing ordeals can include beatings, scarification, intoxication, privation, servile labor, humiliation, and other dysphoric events. Because hazing appears at least nominally irrational (i.e., abusing future allies) it has inspired a variety of different ideas to explain its genesis or persistence. The three most common explanations for hazing (what Cimino calls the "macro theories") are as follows: 1. hazing creates group solidarity, 2. hazing is an expression of dominance, and 3. hazing allows for the selection of committed group members (see review and citations in Cimino, 2011). The macro theories are intended to capture broad thematic similarities in social science explanations of hazing that are evident in different theories and contexts (e.g., gang and fraternity initiations). They are not, however, well-developed or well-substantiated theories. Instead, each encompasses a set of possible mechanisms (e.g., ways for hazing to create solidarity) and their implied predictions. Further, while the macro theories capture the most common explanations of hazing, they are not exhaustive. There is a broad variety of theorizing about hazing practices in different groups and at different levels of explanation (e.g., Cimino, 2016; Grimes, 2000). Some of this theorizing includes claims that are not simply more detailed and contextualized restatements of the macro theories, and can focus on aspects of gender construction or expression (Allan, 2004; Parks & Parisi, 2019) and individual differences in personality (Arteta-Garcia, 2015).

In the sciences, the most commonly tested macro theory of hazing is *solidarity* (see review in Cimino & Thomas, 2022). This is typically tested by measuring hazing's actual or apparent effect on solidarity-relevant cognitions in hazees. That is, hazing's association with increased hazee feelings of group liking, dedication, identification, or similar measures. Recently, Cimino and Thomas (2022) published the first real-world, longitudinal test of this theory in a pseudonymous American hazing fraternity ("Beta"). Contra the solidarity macro theory, they found minimal evidence for a non-trivial relationship between hazing severity and feelings of solidarity. They also found a number of similarly negative or equivocal findings in the primary literature. In considering all of these results, they suggested the following:

> One possibility is that lengthy, intense hazing processes are in many instances reflections of evolved motivations that were not designed to generate solidarity in newcomers. These motivations may instead be oriented toward cowing and controlling potentially exploitative newcomers and (where possible) encouraging the less-committed among them to disassociate (see Cimino, Toyokawa, Komatsu, Thomson, & Gaulin, 2019). As a shared hardship, such a process

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might also create solidarity among newcomers, but it might do so in a way that is inefficient or inconsistent because it is not well-designed for that purpose. (p. 416).

While Cimino and Thomas's dataset does not have variables that allow for testing hazing's capacity to cow or control newcomers (i.e., the dominance macro theory), it does allow for testing hazing's capacity to encourage the selective attrition of low-commitment newcomers (i.e., the commitment macro theory). Thus, in this article, we consider whether patterns of attrition in Beta support such selectiveness (see our Methods section).

Note that the commitment macro theory encompasses claims about hazing that are not explicitly evolutionary. That is, many researchers have suggested or implied that hazing leads to the exclusion of low-commitment newcomers, and have done so without any explicit connection to evolved psychology, fitness benefits, or related concepts (e.g., Aronson & Mills, 1959; Vigil, 1996). While our study can address the commitment macro theory as a basic empirical question, it is also of direct relevance to evolutionary theories of hazing and hazing-inclusive phenomena (e.g., costly/dysphoric rituals). For example, automatic accrual theory posits an evolved hazing motivation that, over evolutionary time, may have aided in preventing near-term free-riding strategies (Cimino et al., 2019). One proposition of this theory is that making the time period around group entry particularly costly would have tended to exclude newcomers who—in the short term—were seeking the immediate, obligatory benefits created by the organization (e.g., prestige) without providing commensurate labor inputs. Similarly, the costly signaling theory of religion argues that participants in costly and seemingly arbitrary rituals may be providing hard-to-fake signals of commitment (e.g., Barker, Power, Heap, Puurtinen, & Sosis, 2019; Lang, Chvaja, Grant Purzycki, Václavík, & Staněk, 2022; Sosis & Alcorta, 2003; Sosis & Bressler, 2003; Sosis, Kress, & Boster, 2007; Xygalatas et al., 2019). With respect to hazing, these theories overlap in so far as they predict that hazing will tend to exclude low-commitment newcomers. But automatic accrual theory interprets other features of hazing—namely the active coercion of hazees—as showing that hazers often devalue receiving clear, non-coerced signals of commitment (Cimino, 2011, 2013, 2016; Cimino et al., 2019). This would make the exclusion of low-commitment newcomers a largely indirect process that does not straightforwardly correspond to the kind of signal sender/receiver relationships implied by the costly signaling theory of religion (for a related discussion, see Henrich, 2009). Our study cannot directly address these more fine-grained theoretical differences, but we note them to better situate this article in the relevant literature. (For a detailed explanation of automatic accrual theory, see Cimino et al., 2019).

In assessing the efficacy of a practice like hazing from an evolutionary perspective, it is worth highlighting the fact that evolved strategies need only have worked *on average* to be selected. However, this does not mean that we should decline to investigate hazing's capacity to accomplish one of its putatively evolved functions. Building a complete empirical picture of what hazing is doing in the present may help to eventually illuminate what hazing did (and did not do) in the past.

1. Defining hazing

In the social sciences, there are a variety of hazing definitions that largely overlap with one another. All common definitions of hazing are at least partially subjective and assume reasonable observers (e.g., Allan & Madden, 2012; Hoover, 1999). However, definitions vary in their specificity and tendency toward false positives. As such, we employed the less-commonly used "strict" definition of hazing (Cimino, 2017, 2007) because we consider it to be more precise about the set of behaviors and circumstances that constitute the phenomenon under study:

> Hazing is non-accidental, costly aspects of group induction activities that: a) do not appear to be group-relevant assessments/preparations, or b) appear excessive in their application. Group induction activities are those tasks formally or informally required to obtain membership or participatory legitimacy for new or prospective members. (Cimino, 2017, p. 144).

For example, calisthenics is a group-relevant assessment or preparation for athletic teams, but not for social fraternities. While the strict definition circumscribes the practices under investigation, it is not itself a claim about hazing's lack of function or group utility. It remains possible that hazing is cryptically group relevant in any number of ways, including those suggested by the macro theories (e.g., Keating et al., 2005). For an extended discussion of the strict definition relative to alternatives, see Cimino (2017) and Thomas, Cimino, and Meglich (2021). For more on the definition of hazing, see Crow and Macintosh (2009) and Ellsworth (2004).

2. The commitment macro theory and common properties of social fraternities

The commitment macro theory is the idea that hazing allows for the selection of committed group members. The means by which this selection takes place is not always made explicit by researchers, hence our use of the passive term "allows". We interpret the commitment macro theory as logically requiring at least the following two propositions: 1. There are varying representations of intrinsic group valuation in the minds of newcomers (i.e., "commitment"). 2. Hazing ordeals can differentially motivate low-commitment newcomers to exclude themselves from the group, and/or provide cues that allow hazers to make such exclusions themselves (see the next section).

The commitment macro theory encompasses different possibilities about the targets of newcomer commitment. Specifically, hazing might allow for the exclusion of newcomers with low commitment to (a) the group as a whole, (b) their fellow hazees, or (c) both.

When applied to Beta (and many other American social fraternities[1]), these categories are as follows:

a) The group as a whole ("chapter"): National fraternities have school-specific chapters, each with their own history and membership roster. Larger fraternities may have hundreds of chapters spread across the country.

b) Fellow hazees ("pledges"): Pledges are formally recognized fraternity inductees. That is, individuals who have been pre-approved through a process called "rush" to participate in the fraternity's induction process. Once pledges complete the induction process, they are formally initiated and become "actives".

Given these definitions, we tested a straightforward prediction made by the commitment macro theory:

Experienced hazing severity will positively predict attrition for pledges with low levels of commitment to (a) the chapter, (b) their fellow pledges, or (c) both. Any such association(s) will either not exist for pledges with high levels of commitment or will be markedly smaller.

The accuracy and consistency with which hazing excludes low-commitment inductees is relevant to the explanatory power of the commitment macro theory. If lengthy, non-trivial hazing fails to exclude many low-commitment inductees, it might suggest that hazing inductions are not well-designed for such a purpose. Further, it might suggest that any putatively evolved hazing motivation arose for reasons largely unrelated to its ability to bring about selective newcomer attrition, or that said motivation is a kind of byproduct.

[1] For a historical discussion of pledging, chapters, and other common elements of Greek culture, see Baird (1991). Note also that different fraternities may use different terms to signify similar processes and categories.

3. Why hazing might exclude low-commitment newcomers

Prior to reviewing the relevant literature, it is worth briefly describing why hazing might exclude low-commitment newcomers from voluntary associations:

3.1. Prospective hazee-based exclusion

Prospective hazees may decide to exclude themselves from even attempting to join a hazing group based at least partly on the anticipated, cumulative cost of hazing or some proxy thereof (e.g., anticipated dysphoria). Costs could include opportunity costs, energetic costs (e.g., calisthenics), somatic costs (e.g., beatings), and social costs (e.g., humiliation). While hazing groups are often highly secretive with respect to the specifics of their practices, local knowledge that some form of hazing is present and non-trivial may sometimes be an open secret (Allan, Kerschner, & Payne, 2019; Parks, Ray, Jones, & Hughey, 2014). That said, we expect that prospective hazees will tend to have imperfect information about the total costs entailed by an induction and further that they may receive contradictory information from the hazing group. Fraternity members, for example, are motivated to at least initially deny or downplay hazing, as doing otherwise may open them up to university investigations.

3.2. Hazee-based exclusion

Hazees may decide to exclude themselves from an induction process based at least partly on the experienced, accumulated costs of hazing, or some proxy thereof (as enumerated above).

3.3. Hazer-based exclusion

Hazers may decide to exclude hazees based at least partly on commitment-relevant inferences derived from their behavior around hazing ordeals (e.g., observed reticence or resistance to being hazed).

Hazing is not the only possible source of inductee attrition. For fraternities in particular, when the induction process begins, actives may decide to exclude pledges for reasons wholly unrelated to their behavior around hazing ordeals. Such decisions may reflect judgments that are (or are not) correlated with our measures of interest (i.e., commitment and experienced hazing severity). Reasons for excluding particular pledges could include their poor behavior while drunk or active-specific social violations (e.g., getting in a fight with a particular active). While we suspect that—in their sum—differing reasons for excluding pledges will tend to make finding our predicted relationship(s) more difficult, we cannot rule out the obverse a priori.

4. The on-the-ground reality of fraternity inductions

The three basic categories noted above are meant to provide a high-level summary of how commitment-related, hazing-based attrition might happen. However, from an anthropological perspective, it is important to acknowledge the on-the-ground character of fraternity hazing, and the kinds of social processes that may be occurring. Consider the following examples:

4.1. Targeting

In order to motivate disassociation, individual actives might sometimes target specific, disfavored pledges for increased hazing. For example, in a different pseudonymous fraternity—"Alpha"—the PI once observed an active saying (approximately) "I bet I can get [specific pledges] to de-pledge". That is, the active was confident that, during the hazing process, he could generate enough discomfort to get a few specific, devalued pledges to exclude themselves from the process and thus obviate the need to formally exclude them.

4.2. Interventions

Actives can intervene in what would otherwise be straightforward instances of hazee-based exclusion. For example, a valued pledge that is considering exiting the induction process may be confronted by actives who reassure or cajole him and convince him to stay. To understand why this might happen, consider first that fraternity chapters lose actives to graduation every year, and thus must continually induct new members in order to preserve their existence. This means that while nearly all chapters can afford to lose some proportion of incoming pledges, they can rarely afford to lose all. Individual pledges may also be differentially valued for apparent personality characteristics, shared hobbies, social connections, etc. It is worth noting that, at the time of study, Beta was a successful fraternity on their campus and did not appear to be struggling with respect to its need for incoming pledges.

4.3. Coercion

Our description of hazer-based exclusion might give the impression that most hazing, including fraternity hazing, is conducted in a careful and clinical manner that would allow hazers to maximize accurate inferences of commitment in hazees. But as noted in our introduction, this is very much not so. As in many other hazing groups, fraternity hazing is often coercive, and can involve deception, intense intoxication, sleep deprivation, intimidation, and other tactics (e.g., Cimino, 2011, 2016). A coercive environment is used to confuse and intimidate pledges in ways that increase their acquiescence to hazer demands. In general then, we suspect that most of the attrition attributable to hazing is due to decisions made by hazees.

While we will be addressing fraternity hazing at a higher level of analysis (e.g., in terms of overall severity and attrition) it is important to understand that our variables may be summatively tracking relatively complex and strategic social situations.

5. What we know about hazing and commitment

We consider it reasonably well-established that, across human ancestral environments, incumbent members of enduring coalitions would have had strong adaptive reasons to attend to cues of commitment in prospective group members (e.g., Cimino, 2011; Cimino et al., 2019; Cimino & Delton, 2010; Delton & Cimino, 2010; Sosis et al., 2007). Further, while incumbent members' conscious reasoning about such cues is not necessary for the commitment macro theory to be true, it nonetheless appears to be the case that incumbents often consciously care about prospective member commitment or similar, overlapping constructs (e.g., trustworthiness, see Cini, Moreland, & Levine, 1993; Cottrell, Neuberg, & Li, 2007; McCreary & Schutts, 2019). Further, ostensible concern about commitment in prospective members may positively predict hazing motivation among fraternity members (McCreary & Schutts, 2019).

A number of vignette experiments also suggest that the perception of obligatory, "automatic" group benefits increases the desire to haze newcomers. That is, when study participants imagine themselves as incumbent group members, and learn (or believe) that their group has high immediate benefits like prestige, they tend to create more severe inductions (Cimino, 2011, 2013; Cimino et al., 2019; but see Kavanagh, Jong, McKay, & Whitehouse, 2019). This makes sense if groups with high initial benefits are (or were) more at risk of near-term exploitation by low-commitment individuals (e.g., free riders).

With respect to measures that may predict group attrition, some real-world survey evidence suggests that experiences of hazing may increase hazee intentions to leave a group (Groah, 2005; Meglich & Thomas, 2021) and reduce organizational commitment (Mawritz, Capitano, Greenbaum, Bonner, & Kim, 2020). More directly, Josefowitz and Gadon's (1989) retrospective survey of occupational hazing indicated that hazing motivated 10% of their sample to quit their jobs.

Alongside these empirical findings are a number of verbal and mathematical models suggesting why we might expect hazing (or hazing-inclusive phenomena) to exclude less-committed members, either in human ancestral environments or at present (e.g., Cimino et al., 2019; Henrich, 2009; Iannaccone, 1992; Sweet, Sturm, Zare, & Valenzuela, 2022).

While all of the above literature has helped inform our understanding of hazing, the focus of this research report is on moving beyond simplified models and supportive but causally distal findings (e.g., incumbent members value commitment). At present, we know of no research that has attempted to measure the ostensible effect of real-world hazing on the attrition of newcomers that measurably vary in commitment. Thus, using the dataset originally gathered by Cimino and Thomas (2022) to measure hazing's relationship with group solidarity, we now test hazing's relationship with induction attrition and commitment.

6. Methods

The following description is adapted from Cimino and Thomas (2022):

All participants were pledges to the pseudonymous fraternity chapter "Beta", located at an anonymous university in the United States. In order to conduct the study, the principal investigator established a rapport with an active member of Beta. (Note that the PI was neither an active nor alumnus of Beta.) Through the PI's relationship with this active member and subsequent conversations with other Beta actives, the chapter formally agreed to participate in a longitudinal survey study of their induction process. The study period covered their approximately ten-week induction, with pledges filling out the same survey at five time points. Each anonymous survey measured pledges' self-reported ratings of the harshness and fun of their induction and self-reported ratings of solidarity (including commitment, see Measures for details). This process was repeated for six different Beta pledge classes between January 2012 and October 2014 (total $N = 126$, Table 1).

For each pledge class, the study proceeded as follows:

The PI would communicate with a representative of Beta. The representative and the PI would come to an agreement on the specific date of the initial four survey time points. The 1st time point was always during the first week of pledging. The 5th time point was always during the last week of pledging, and because this could vary, the 5th time point was agreed upon once the induction was closer to completion. Separation between time points was intended to be around two weeks, but maximal flexibility was given to Beta to determine specific dates that made sense in the context of the induction. Because of this fact, time points could vary considerably. For example, pledge classes E and F reached the 4th time point near the end of a normal academic school year, and thus the induction process (and the 5th time point) was put on hold until Fall.

Table 1
Inferred attrition across beta's induction process.

	Remaining Pledges at Time Point				
Pledge Class	1	2	3	4	5
A	15	10	10	9	9
B	15	10	8	7	7
C	41	31	29	25	22
D	8	5	5	5	5
E	20	14	9	9	7
F	27	18	17	17	17
Total	**126**	**88**	**78**	**72**	**67**

For time point 1 of each study period, the PI would visit the fraternity house and pay the chapter $250 (for pledge class A) or $265 (for all subsequent pledge classes).[2] The PI would then introduce himself to the pledge class, and describe how the study would proceed. The PI noted that pledges could choose whether to participate, that there were no right or wrong answers, and that individual survey responses would be anonymous and unknown to the actives. Pledges were offered $5–$10 for their participation, depending on available funding during the study period. The PI would then distribute the 1st time point survey to the pledges, wait until all participants had completed it, and then collect the surveys and pay the participants. The PI would provide Beta with a large plastic tub that contained the surveys for time points 2, 3, and 4. (Time point 5 was done in-person, like time point 1; see below.) The tub also contained stamped envelopes with the PI's mailing address for the contained surveys. Printed on the tub was a reminder of the agreed-upon survey dates, and contact information for both the researcher and local Institutional Review Board.

For time points 2, 3, and 4, the PI was not present. Instead, Beta would direct the pledges to somewhere of their choosing to fill out the surveys. Beta agreed to ensure that actives were never present while the pledges filled out their surveys, and additionally agreed that they would never ask pledges about their answers.[3] In order to increase pledge confidence in anonymity, two steps were taken. First, pledges did not write their names on their surveys. Instead, pledges wrote their favorite color and mother's birthday. Second, for time points 2, 3, and 4, pledges placed their surveys inside the aforementioned stamped envelopes and took them to a nearby mailbox after completion.

For time point 5, the PI once again visited the fraternity house in-person and gave the chapter a second payment of $250 (for pledge class A) or $265 (for all subsequent pledge classes). As with time point 1, the PI distributed the survey, collected the completed versions, and (for pledge classes A, C, D, and F) paid an additional $5 to participants.

For additional, fine-grained methodological details and caveats, see Cimino and Thomas (2022, pp. 411-412). The complete dataset, codebook, and stimuli for this article is available at http://www.aldocimino.com/commitment_data.zip.

6.1. Measures

As a reminder, we are investigating the following prediction:

Experienced hazing severity will positively predict attrition for pledges with low levels of commitment to (a) the chapter, (b) their fellow pledges, or (c) both. Any such association(s) will either not exist for pledges with high levels of commitment or will be markedly smaller.

Below we list our induction and commitment measures. Excepting Induction Attrition, measure summaries are adapted from Cimino and Thomas (2022):

6.1.1. Induction harshness

Induction Harshness was the mean of four items using 7-point rating scales (1 = Not at all; 7 = Very Much), and was designed to be our operationalization of hazing severity. All items consisted of the phrase "How [adjective] is the pledging process?", where the adjectives were harsh, stressful, tough, and unpleasant. Note that it is almost always the case that when fraternity inductions are in any way harsh, it is because they are integrating hazing ordeals, and hazing was known by the PI to be taking place in Beta.

[2] Chapter payments were made to collectively reimburse actives for their time, as the study process required their cooperation and necessarily inconvenienced them.

[3] The PI was not living in the fraternity house and as such was not in a place where he could verify that all rules were followed.

6.1.2. Induction fun

Induction Fun was constructed identically to Induction Harshness, except the adjectives were fun, entertaining, enjoyable, and pleasant. It is important to have a measure like Induction Fun because not every fraternity induction activity qualifies as hazing, or is even intended to be an ordeal. There can be genuinely enjoyable interludes in the midst of a fraternity's hazing induction process (e.g., parties), or just activities that are straightforward, group-relevant, and interesting (e.g., learning about the chapter's history).

6.1.3. Induction attrition

Induction Attrition was a binary variable (0 = Stayed, 1 = Exited). A participant was inferred to have exited the induction between two time points if they submitted a survey at the earlier time point and failed to submit a survey at the later time point and all time points thereafter. This is a reasonable inference because the surveys for time points 1 and 5 were both done in-person, allowing the PI to directly observe pledge participation. The PI did not observe any non-participants at these time points, meaning that if a participant was not present at time point 5, he had very likely exited the induction process. We use the term "very likely" because these observations are not faultless: Some participants may have been absent due to sickness or other issues and it is also possible that a few non-participants were missed due to inattention by the PI. Any such instances, however, should not bias our findings toward a Type 1 error and should simply increase measurement noise.

6.1.4. Pledge class communal strength

(adapted from Mills, Clark, Ford, & Johnson, 2004) Pledge Class Communal Strength was the mean of 10 items using 10-point rating scales (1 = Not at all; 10 = Extremely). Participants indicated how much dedication they felt to their pledge class, responding to items like "How happy do you feel when doing something that helps the pledge class?" and "How high a priority for you is meeting the needs of the pledge class?"

6.1.5. Chapter communal strength

(adapted from Mills et al., 2004) Chapter Communal Strength was constructed identically to Pledge Class Communal Strength, except "pledge class" was replaced with "chapter" (e.g., "How high a priority for you is meeting the needs of the chapter?").

6.2. Data analysis

We employed a logistic regression using panel data. A panel analysis can be used to study data where the same participants have multiple responses distributed across time. Our panel analysis was structured as follows:

1. Participants were the panel-level variable. That is, the panel was run at the level of the individual.
2. Study time points (1–5) were assigned as the time-level variable.
3. Induction Attrition was assigned as the outcome variable. As noted in the description of our measures, Induction Attrition indicates whether we infer that a participant exited the induction in the period between two time points. (That is, a participant submits a survey at time point x, but not at the subsequent time point, nor any thereafter.).
4. For each participant who exited the induction, predictor variables are their survey responses from the time point immediately preceding their exit. That is, if a participant exits after time point 2 but prior to time point 3, their scores are from time point 2. For each participant who stayed in the induction, predictor variables are their scores from time point 5.

Note that we are using unbalanced panel data, as we do not expect there to be an equal number of observations per participant. (If a participant exits the induction prior to the final time point, their responses are necessarily excluded from subsequent time points.)

For our initial analysis, we ran all our named variables as simultaneous predictors of Induction Attrition: Induction Harshness, Induction Fun, Pledge Class Communal Strength and Chapter Communal Strength, as well as interactions between both communal strength variables and Induction Harshness. All four of the predictor variables were centered around their individual means. A random effects panel analysis model was employed.

7. Results

Table 2 presents descriptive statistics, internal consistency estimates, and bivariate correlations for the four predictor measures used in this study. Induction attrition for each of the six pledge classes across all time points is shown in Table 1. (Note that demographic information is not presented because it was not collected from participants.) We discuss the results relevant to the commitment macro theory below.

7.1. Induction harshness and communal strength as predictors of attrition

In our initial model with all variables and interactions included, higher levels of Induction Harshness did not significantly increase the odds of a pledge exiting the induction (*Log Odds* = 0.361, *SE* = 0.302, $p = 0.233$). There were also no significant interactions between either commitment variable and Induction Harshness: Pledge Class Communal Strength (*Log Odds* = −0.26, *SE* = 0.23, $p = 0.258$) or Chapter Communal Strength (*Log Odds* = −0.12, *SE* = 0.19, $p = 0.515$). The overall model was non-significant ($\chi^2 = 6.39$, $p = 0.382$).

Given the high correlation between our commitment measures ($r = 0.78$) and our limited sample size, we ran this same model twice more with a modification: Each time we used only one of our commitment measures, rather than both. In the model using only Pledge Class Communal Strength as a commitment variable, we found again that higher levels of Induction Harshness did not significantly increase the odds of a pledge exiting the induction (*Log Odds* = 0.369, *SE* = 0.31, $p = 0.227$). However, the predicted interaction between Pledge Class Communal Strength and Induction Harshness was significant (*Log Odds* = −0.38, *SE* = 0.17, $p = 0.024$). As before, the overall model was non-significant ($\chi^2 = 5.95$, $p = 0.203$).

In the model using only Chapter Communal Strength as a commitment variable, we found that higher levels of Induction Harshness (Log Odds = 0.697, SE = 0.30, $p = 0.019$) and Chapter Communal Strength (*Log Odds* = 0.583, *SE* = 0.30, $p = 0.050$) significantly increased the odds of a pledge exiting the induction. We also found the predicted interaction between Chapter Communal Strength and Induction Harshness (*Log Odds* = −0.41, *SE* = 0.14, $p = 0.003$). This time, the overall model was significant ($\chi^2 = 14.26$, $p = 0.007$). Given the model's greater power to explain attrition in our sample and the higher probability that the observed relationships were non-stochastic, we tentatively adopted this model (Table 3). We also plotted the interaction between Chapter Communal Strength and Induction Harshness to visually demonstrate the differing predictive impact of hazing severity (Fig. 1)

7.2. Exploratory tests on chapter communal strength

Because our study was designed to test for an interaction between hazing severity and commitment, we made no explicit prediction about what the main effect of commitment would be when also modeling its interaction with hazing severity. It is nonetheless surprising to find that, in our adopted model (Table 3), Chapter Communal Strength is significant and positively predicts Induction Attrition. In order to investigate this counterintuitive finding, we tested for whether the main effect of Chapter Communal Strength remained significant when excluding its interaction with Induction Harshness. It did not: Chapter Communal

Table 2
Descriptive Information, Bivariate Correlations, Internal Consistency Estimates for Measured Variables.

					Bivariate Correlations[1]			
Measured Variable	*N*	*M*	*SD*	*Range*	1	2	3	4
1. Induction Harshness	402	4.21	1.39	1.00–7.00	0.89			
2. Induction Fun	402	5.08	1.20	1.00–7.00	-0.38*	0.90		
3. Pledge Class Communal Strength	401	7.31	1.63	2.00–10.00	0.08	0.33*	0.89	
4. Chapter Communal Strength	402	6.72	1.74	1.00–10.00	-0.04	0.46*	0.78*	0.83

Note: *N* values correspond to observations, not participants (participant $N = 126$). Tests for Tolerance and Variance Inflation Factor (VIF) revealed no obvious multicollinearity between the listed variables (largest VIF = 2.88, lowest Tolerance = 0.35).

* $p < 0.05$.

[1] Cronbach's Alpha estimates of internal consistency are displayed in the diagonal for all multi-item measures.

Table 3
Conditional Logistic Regression Predicting Induction Attrition Using Centered Predictors.

	Coefficient	Std. Error	Test Statistic	*p*-Value
Induction Fun	−0.08	0.38	−0.23	0.820
Induction Harshness	0.70	0.30	3.36	0.020
Chapter Communal Strength	0.58	0.30	3.25	0.050
Chapter Communal Strength x Induction Harshness	−0.41	0.14	−2.97	0.003
Intercept	−6.08	0.59	−10.35	<0.001

Note. Coefficients represent changes in the log odds of exiting the induction; positive coefficients indicate an increased probability of exiting. The proportion of total variance accounted for by panel-level variance (ρ) was 0.97 ($\chi 2 = 14.26$, $p = 0.007$), standard deviation (σ) of panel-level variance was 10.98.

Strength ($p = 0.662$) and Induction Harshness ($p = 0.230$) were non-significant predictors of Induction Attrition unless their interaction was included in the model. This suggests that our predicted interaction is driving these key relationships. In order to investigate this further, we plotted levels of Chapter Communal Strength and Induction Harshness together (Fig. 2).

Fig. 2 suggests that, at lower levels of Chapter Communal Strength, there is an initially differentiated predictive impact of Induction Harshness that begins to converge at higher levels of Chapter Communal Strength. In other words, variance in hazing severity appears predictively meaningful for lower-commitment pledges, but not for higher-commitment pledges. One interpretation of this finding is that, for pledges with higher commitment, exiting decisions were relatively independent of hazing severity, and had other causal pathways that were not well-captured by our methods or measures (e.g., disillusionment with the local Greek community). In our sample, these higher-commitment pledges may have encountered a number of these idiosyncratic causes. This is important to consider, as higher commitment pledges were not less likely to exit the induction overall (a subset of them were more likely to exit). Instead, their exiting events were just less clearly impacted by hazing.

Taken as a whole, we think that our measure of commitment (Chapter Communal Strength) is indexing an initially cooperative stance and willingness to work on behalf of the chapter (e.g., "How large a cost would you incur to meet a need of the chapter?") but is not directly measuring an unconditional desire to remain. Thus, while the measure is a facet of commitment relevant to hazing's ability to exclude near-term free riders, it will need to be supplemented by other measures of commitment in future studies. (For the relevance of near-term free riding to the psychology of hazing, see Cimino et al., 2019.)

8. General discussion

Across the measured study period, nearly half of Beta's pledges

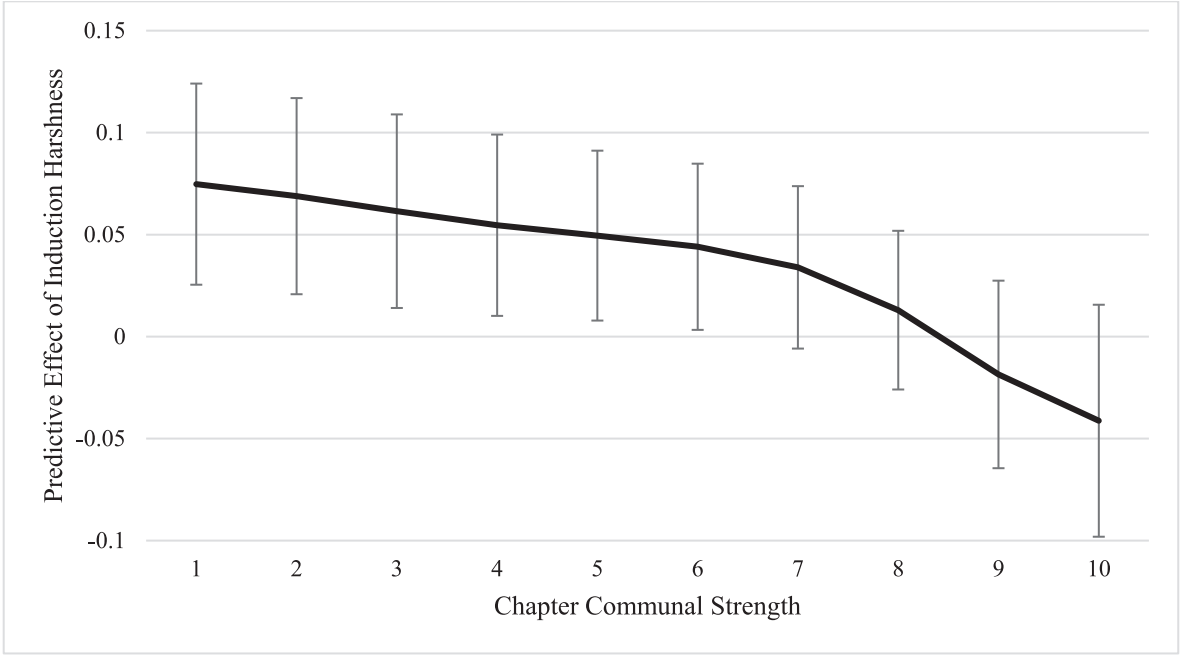

Fig. 1. Predictive effect of Induction Harshness on exiting at different levels of Chapter Communal Strength. Values shown are non-centered for ease of visual interpretation. Error bars show 95% confidence intervals.

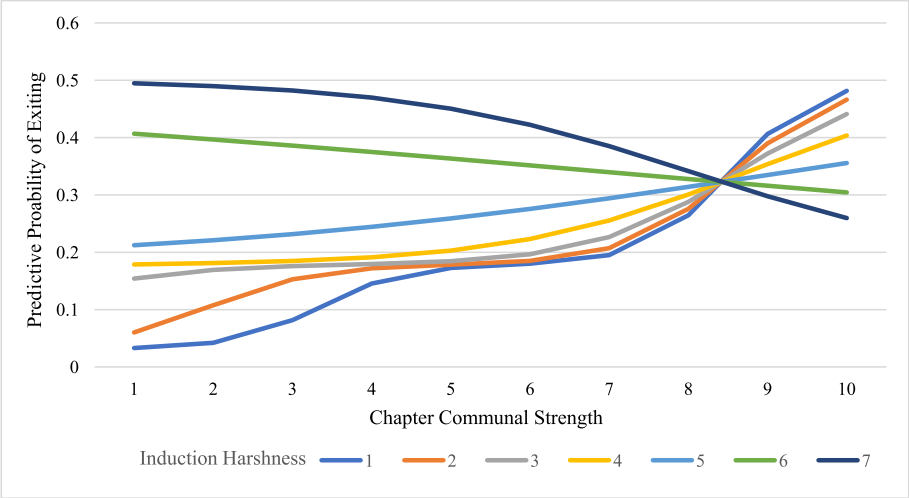

Fig. 2. Predictive probability of exiting at different levels of Chapter Communal Strength and Induction Harshness. Values shown are non-centered for ease of visual interpretation. Confidence intervals are not shown because the seven-fold overlap of intervals at each measurement level makes them unreadable. For a complete list of confidence intervals for Fig. 2, see our data file package (linked in Methods).

exited the induction process. While our analyses cannot be used to draw firm causal inferences, they are consistent with the possibility that hazing was one cause of such attrition and that hazing differentially caused the attrition of low-commitment pledges (Fig. 1). This article thus constitutes the first real-world, longitudinal evidence for the commitment macro theory of hazing. As with the previous study on Beta (Cimino & Thomas, 2022), our findings have additional import because they were derived from an in situ study of an actual hazing organization.

Nonetheless, our study has important limitations and caveats. First, as mentioned prior, there are a variety of different reasons why pledges exit fraternity induction processes. The dataset from which our study is derived was not designed to capture these various reasons, which leaves open the possibility that key variables are confounded. Even if such confounding is not taking place, our study uses a relatively small sample for our research question as well as measures that may have considerable noise. While measurement noise will generally attenuate statistical relationships, smaller samples can distort population-level effect sizes, possibly to the point where such noise could be overcome. We also note that the most important effect observed in our study is an interaction between hazing severity and commitment in predicting attrition (Fig. 1). Interactions can be difficult to replicate and researchers are justified in regarding an initial report of an interaction with some reserve, especially one that is not derived from a large sample. Further, the presence or absence of this interaction deserves special scrutiny in any follow-up study because of what the commitment macro theory predicts and what kinds of attrition-related findings underdetermine those predictions. Specifically, it is not enough to find that hazing positively predicts attrition by itself, as this shows no evidence that such attrition is selective with respect to commitment. Nor is it sufficient to find that low commitment positively predicts attrition by itself, as this shows no connection to hazing. Instead, one must find that hazing is *better* at positively predicting the attrition of low-commitment newcomers than of high-commitment newcomers. This is the only effect capable of directly testing the theory in the Cimino and Thomas (2022) dataset and, we suspect, any similarly constructed dataset.

Finally, although we tentatively adopted a model (Table 3) where we removed one of our measures of commitment (Pledge Class Communal Strength), we did so based on that model's statistical properties in the context of our limited sample. As such, we do not make any claim as to its superior verisimilitude. In other words, our choice should not be interpreted as suggesting that internal pledge class commitment is irrelevant to exiting events in real-world fraternity inductions. Coming to such a conclusion would require a much larger and more comprehensive study. More broadly, we emphasize that Beta is a single chapter of a single fraternity, and as such any findings derived from them can only be cautiously applied to similar groups. For additional caveats regarding the study of Beta, see Cimino and Thomas (2022, p. 415).

9. The challenges of studying hazing

In this article, we have reported a hypothesis test using a dataset that allows but is not purpose-built for said test. This restricts testing to only some versions of the target theory and also means that the evaluated variables are limited. In well-developed areas of the social sciences with many hundreds if not thousands of rigorous studies (e.g., stereotyping psychology), the utility of reporting findings with a less-ideal dataset could be rightfully questioned. However, there are key issues in the nascent scientific study of hazing that raise the current import of studies like our own:

1. No common access to real-world hazing groups. Many hazing groups are engaged in activities that are legally prohibited, heavily moralized by outsiders, and subject to extralegal, administrative punishment (e.g., from universities). Even without such negative incentives, hazing groups are often deeply secretive and consider the details of their induction practices to be insider-only knowledge. Consequently, extended research access to real-world hazing groups is very difficult to obtain. Other than Lodewijkx and Syroit (1997) and Cimino and Thomas (2022), we know of no researchers who have successfully produced quantitative, longitudinal field studies on the effects of hazing.
2. No well-established methods or measures. Excepting some replications of Aronson and Mills (1959), there are no commonly used experimental or field methodologies to study hazing (see Cimino & Thomas, 2022). Further, there are no widely used measures of hazing severity, hazing motivation, etc. In order to make cumulative progress on understanding hazing, the community of interested researchers must have a shared record of what measures are (and are not) predicting outcomes of interest, especially from real-world hazing groups.
3. No clear agreement on the relative need for testing. Here and elsewhere we have argued that the most important theoretical claims about hazing are the macro theories. That is, hazing's capacity to create solidarity, establish dominance, or select for committed newcomers. As noted in our introduction, the macro theories are

often implicitly endorsed by researchers, but that does not mean that they are well-established from a scientific perspective (Cimino, 2011, p. 262). Indeed, Biddix, Sasso, Perlow, Joyce, and Veldkamp (2022) recently reviewed the literature on hazing and reaffirmed Cimino's (2011) assessment that we have minimal scientific knowledge on the phenomenon (i.e., "This deficiency has not substantially changed in the past decade.", p. 4). Thus, the evidence for *any* hazing theory—macro or otherwise—remains tentative. We suggest that one of the reasons for this slow progress is that there is no clear agreement on what theories or hypotheses ought to be prioritized for testing. This is exacerbated by the fact that hazing, in various contexts, has been the target of over a century of theorizing. Any interested scholar is confronted with a veritable blizzard of potentially conflicting observations, hypotheses, and theoretical frameworks (e.g., Allan, Joyce, & Perlow, 2020; Cimino, 2011; Parks, 2022). While this has made for a diverse literature, it has not made for cumulative scientific progress. Given both the age and endurance of the macro theories in the social sciences, we suggest that they be prioritized and subjected to direct and harsh empirical tests. The macro theories are additionally important because of hazing's potential connection to evolved coalitional psychology. That is, a more complete scientific understanding of hazing may eventually provide a window into how humans think about the maintenance of enduring coalitions (Cimino et al., 2019), and perhaps group newcomers more broadly (e.g., Cimino & Delton, 2010; Delton & Cimino, 2010).

While challenging, we believe that all of the above issues can be either lessened or surmounted over time, and that this study represents an important step forward in that larger effort. With many informed follow-ups, the research community can triangulate on a more accurate and complete understanding of an enduring social science enigma.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Ethics and the study of hazing fraternities

This article uses data derived from a study that was itself part of a larger set of ethnographic examinations (Cimino & Thomas, 2022). Said work was given an umbrella IRB approval by the associated university. As part of that approval process, the PI was asked the following question: "Will you intervene if someone is in danger? What will you do? What type of situation would cause you to intervene?" To which the PI answered: "If I see or anticipate serious bodily harm or an otherwise life-threatening situation I will intervene via calling the appropriate authority (police, ambulance, etc.) and doing what I can to immediately help the situation." At no point in the PI's study of Beta did he receive information about Beta's pledging process that he judged to constitute serious bodily harm or a life-threatening situation. As such, the study was conducted and completed without issue.

In terms of the ethics of studying deviant groups, we note that field work is sometimes conducted by social scientists who study individuals engaged in illegal or dangerous activities. There are a number of university-approved academic field studies of gangs, for example, that involve spending time with and interviewing individuals who may be engaged in (or have conducted) serious criminal actions (e.g., Alsaybar, 2007; Bolden, 2013; Decker & Van Winkle, 1996; Jankowski, 1991). These kinds of studies are sometimes necessary in order to better understand hidden social worlds.

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