

MR. KEVIN SCOTT KUEHN (Orcid ID : 0000-0002-7985-613X)

Article type : Original Article

WORDS: 4,771

Identifying person-specific coping responses to suicidal urges: A case series analysis and illustration of the idiographic method

Kevin S. Kuehn, M.S.¹

Katherine T. Foster, Ph.D.¹

Ewa K. Czyz, Ph.D.²

Cheryl A. King, Ph.D.²

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the [Version of Record](#). Please cite this article as [doi: 10.1111/SLTB.12841](https://doi.org/10.1111/SLTB.12841)

This article is protected by copyright. All rights reserved

1. Department of Psychology, University of Washington
2. Department of Psychiatry, University of Michigan

Authors Note

The research reported in this manuscript was supported by training grants from the National Institute of Mental Health (F31MH117827; PI - Kuehn, and K23MH113776; PI - Czyz), a grant from the American Foundation of Suicide Prevention (PDF-0-028-14; PI - Czyz), and by the Michigan Institute for Clinical and Health Research's Postdoctoral Translational Scholar Program. Correspondence should be addressed to Kevin S. Kuehn, Department of Psychology, University of Washington, Seattle, WA 98105. E-mail: kskuehn@uw.edu

Conflicts of Interest: None

Abstract

Introduction: Suicide is a leading cause of death. One challenge to prevention efforts is the wide phenomenological heterogeneity in suicidal urges, thoughts, and behaviors across individuals at risk. Despite this heterogeneity, most suicide research estimates group-level effects by averaging across people as if they were the same, preventing detection of person-specific factors that may modulate risk and be key to effective prevention. The goal of the present study is to illustrate the idiographic (i.e., person-specific) approach and highlight its utility for suicide research. **Methods:** We implement a case series approach using three cases from a subset of psychiatrically hospitalized adolescents who provided intensive longitudinal data on daily urges and coping behavior after discharge following a suicide attempt. For illustration, person-specific, bidirectional links between suicidal urges and coping behavior were modeled across a series of cases using a vector autoregression approach. **Results:** The relationship between suicidal urges and coping differed across the three individuals, who were presented to exhibit the range of this variability in the presence/absence and magnitude of effects. **Conclusions:** Individuals who report similar suicidal risk levels likely respond in individualized ways to suicidal urges (e.g., use different coping strategies), necessitating personalized assessment and treatment. We discuss implications for future suicide research.

Keywords: ecological momentary assessment, suicide, developmental psychopathology, idiographic methods, precision medicine

1 Identifying person-specific coping responses to suicidal urges: A case series analysis and
2 illustration of the idiographic method
3

4 Suicide is the 2nd leading cause of death among United States youth ages 12-19 (CDC,
5 2020), and the 2nd leading cause of death globally among individuals ages 15-29 years (World
6 Health Organization, 2018). From 2000 to 2017, the rate of suicide deaths among U.S. youth
7 ages 15-19 increased by 47% (Miron, Yu, Wilf-Miron, & Kohane, 2019). Although the initial
8 reports on the mental health consequences of the COVID-19 pandemic and associated public
9 health measures are mixed (Bryan, Bryan & Baker, 2020), there is some emerging evidence
10 suggesting further increases in the rate of suicidal ideation for young adults 18-24 years old
11 (Czeisler et al., 2020). These increasing rates of mortality and ideation are despite decades of
12 research aimed at identifying risk factors and a growing body of research aimed at decreasing the
13 prevalence of suicidal thoughts and behaviors (STBs).

14 STBs vary across people in their phenomenology (i.e., frequency, duration, and intensity;
15 Huang, Ribeiro, Musacchio, & Franklin, 2017; Bryan & Rudd, 2015), and appear to be multiply
16 determined (Kuehn, Wagner, and Velloza, 2019), with no clear evidence of a single causal
17 pathway. Recent analyses have highlighted variability in the group-level trajectories of both STB
18 phenomena and their risk factors over time (Bagge, Littlefield, & Glenn, 2017; Kleiman et al,
19 2017; Allan, Gros, Lancaster, Saulnier, & Stecker, 2019; King, Brent, et al., 2019; Czyz & King,
20 2015). Identifying and reducing risk for specific individuals across this heterogeneous group
21 necessitates insight about not only individual-level variation in phenomenology but in the
22 predictive associations that may account for that variation (i.e., person-specific effects).

23 Unfortunately, most statistical procedures employed across these studies and in suicide
24 research more broadly, apply a common cause approach by estimating average, group-level (i.e.,
25 nomothetic) effects that draw single inferences intended to apply to the entire population under
26 study (Molenaar, 2004; Molenaar & Campbell, 2009). A nomothetic inference, for example,
27 could involve testing whether the use of a specific coping strategy predicts reduction in suicidal
28 urge, on average. Yet, person-to-person differences (i.e., individual-level heterogeneity) in the
29 presence, magnitude, and direction of the association between STBs and their risk factors is also
30 important to consider.

31 The most common approaches to considering individual-level heterogeneity in STBs are
32 individual differences models, including multilevel models with random effects. These are
33 intended to capture group-level, phenomenological differences (i.e., who has more risk or what
34 modulates risk at what level). Yet, group-level approaches like these retain assumptions of inter-
35 individual homogeneity (e.g., ergodicity). For example, multilevel models with random effects
36 are routinely expected to account for individual-level variation in group-level effects. Even when
37 random effects are estimated, primary inferences are most often derived from the average/fixed
38 effects. Mathematically, random effects parameterize the between-person *variance* in an effect
39 under the assumption that both the probability of detecting the effect and the degree of
40 measurement error is equally for all individuals. Furthermore, as they derive variance from
41 group-level estimation procedures, random effects do not estimate patterns of person-specific
42 heterogeneity most needed for applying evidence to the individual patient in crisis.

43 A growing body of idiographic work – along with the suicide-risk specific case
44 illustrations we present here – demonstrates that person-to-person differences in the presence of
45 many psychological effects limits the individual-level generalizability of nomothetic research
46 (Borkenau & Ostendorf, 1998; Fisher et al., 2018; Wright et al., 2015). Some individuals simply
47 do not exhibit some effects that are relevant to others. Consequently, person-specific models of
48 predictive relationships (i.e., whether the same level of risk is more likely to have the same
49 potency for different people) may be especially valuable for improving the individual-level
50 precision of nomothetic research (Wright & Woods, 2020; Wright et al., 2015).

51 While idiographic methods are broadly applicable to psychological research, they could
52 be especially important for suicide research where individual phenomenological differences in
53 STBs are observed (e.g., some individuals may report more frequent STBs while others have less
54 frequent but more intense STBs). For example, if distraction is found to reduce suicidal urge on
55 average, the corresponding nomothetic inference suggests that all, or at least most, individuals
56 should experience a reduction in urge when using distraction to cope. Yet, this research does not
57 provide a strong test of whether this effect is either true or meaningful for all individuals
58 sampled. Even when including a covariate that attempts to account for phenomenological
59 variation (e.g., average intensity or frequency), the covariate effects are also assumed to have a
60 uniform influence in all individuals.

61 Expanding the repertoire of STB methods to include idiographic approaches also has
62 translational import for defining actionable targets for people in crisis. A nomothetic framework
63 – even one that accounts for random between-person effects – provides solutions with uncertain
64 value for understanding or predicting the behavior of the individual in crisis (i.e., to what degree
65 does response to a coping strategy vary across people?) while an idiographic one affords a shift
66 to something more personalized (e.g., which coping strategies are effective for this person?).
67 Study of suicide risk using nomothetic approaches may highlight the person-specific nature of its
68 causes or yield person-specific solutions needed to address individuals in crisis.

69 A better understanding of what works for whom (Norcross & Wampold, 2011), and how
70 individuals vary in their proximal risk of suicide and responsiveness to core components of
71 treatment, is a critical step forward for streamlining and tailoring interventions and maximizing
72 their effectiveness across individuals. Coping strategies are thought to play an essential role in
73 mitigating risk for suicide and are, consequently, a common target of many suicide-related
74 interventions (Linehan, 1993; Neacsiu, Rizvi, & Linehan, 2010; Stanley et al, 2009). For
75 example, safety planning, a brief evidence-based intervention (Stanley & Brown, 2012),
76 emphasizes identifying suicide warning signs, increasing capacity for effective coping, and
77 restricting access to lethal means (Stanley & Brown, 2012). Although the decision about *which*
78 coping strategies are incorporated into safety planning for *whom* is a collaborative process driven
79 by individual clients' needs, there is limited evidence regarding the extent to which coping
80 strategies typically incorporated into safety planning work effectively for everyone. Recent
81 nomothetic findings from intensive longitudinal data (ILD) highlight the strong association
82 between coping and STBs, with certain strategies (i.e., distraction and positive activities)
83 associated with a lower risk of STBs at the next time point (Stanley et al., 2021).

84 On the other hand, applying idiographic methods to the same type of data would allow
85 for the understanding of both 1) individual-level variability in the population (i.e., for what
86 proportion of people are certain coping strategies helpful?) and 2) what is helpful for the person
87 presenting at the clinic for services. Answers to these questions would enable greater
88 personalization of safety plans. For example, clinicians often suggest youth distract themselves
89 to manage high-risk periods, however, this strategy is not likely effective for all youth and in all
90 contexts (i.e., some youth may use distraction as an avoidance technique, leading to increases in
91 mental health symptoms and subsequent suicide risk). Nomothetic models ignore these nuances

123 Eleven of the 34 individuals provided data for more than 50 percent of the days and
124 experienced more than 5 suicidal urges over the course of the 28-day observation period. Three
125 of these participants are highlighted below and were chosen to ensure idiographic heterogeneity
126 in effects. Given the high degree of homogeneity in STB phenomenology across these
127 individuals (i.e., all recently hospitalized for suicide-risk, high compliance with daily surveys,
128 and similar STB frequency in the same period), it is reasonable to assume – consistent with
129 traditional approaches – that variability in person-specific effects would be low. More
130 specifically, using an ostensibly homogenous set of individuals reduces the chances that the
131 heterogeneity in effects detected would be attributable to phenomenological differences.

132 *Procedures:*

133 Following discharge from the psychiatric unit, participants responded to daily surveys,
134 using an online link sent via text messages, regarding their STBs and coping styles over a 28-day
135 period. Participants were given up to 1.5 hours to respond to the surveys. Additional details
136 about the daily survey protocol are described elsewhere (Czyz et al., 2018). All procedures were
137 approved by an institutional review board.

138 *Measures:*

139 Suicidal urges: Participants who each day responded affirmatively to the question
140 assessing presence of suicidal thoughts (“At any point in the last 24 hours, did you have any
141 thoughts of killing yourself?”) were asked to rate the intensity of their suicidal urge (“How
142 strong was the urge to act on your thoughts of suicide?”) using a 7-point scale ranging from 1
143 (low) to 7 (high). Participants who denied thoughts of suicide in the past 24 hours were not asked
144 about suicidal urges. Thus, the suicidal urge variable was scored 0 through 7 where 0 represented
145 the absence of suicidal urge. This item was modeled after an item assessing urge to engage in
146 self-injurious behaviors in another ILD study (Nock et al., 2009).

147 Coping strategies: Participants who reported thoughts of suicide were asked, “When you
148 had thoughts of killing yourself in the last 24 hours, did you do any of these things to deal or
149 cope with your thoughts?” Participants who did not report any suicidal ideation in the past 24
150 hours were asked about coping in reference to coping with feelings or stressful events (i.e., “In
151 the last 24 hours, did you do any of these things to deal or cope with your feelings or any
152 stressful situations?). The coping behaviors assessed were consistent with internal and external
153 coping strategies typically included on safety plans (King et al., 2013; Stanley & Brown, 2012).

154 Thus, we identified coping behaviors that mapped onto recommended strategies for coping with
155 suicidal urges or warning signs.

156 The eight coping behaviors measured were: (1) talked to a family member; (2) talked to a
157 friend or another support person; (3) talked to a therapist, counselor, or doctor; (4) contacted a
158 crisis line; (5) tried to distract self with something else; (6) tried to relax or do something
159 comforting; (7) tried to tell self-something calming or positive; and (8) tried a cognitive strategy
160 that involved either (a) thinking about reasons for living (on days suicidal ideation was
161 endorsed) or (b) thinking differently about the situation (on days when ideation was not
162 endorsed). Responses were dichotomized (0 = No, 1 = Yes) to reflect whether a coping strategy
163 was used. The distraction and relaxation items (5 & 6) were combined and dichotomized to
164 reflect emotion-focused coping due to the strong correlation between the two items. We also
165 calculated two variables based on these responses: 1) Sum of coping strategies, calculated by
166 summing across all strategies to reflect the range of strategies tried each day; and 2) a three-day
167 average of summed strategies to reflect an individual's consistent efforts to cope using multiple
168 strategies.

169 Self-efficacy to refrain from suicidal action: Participants were asked, “How confident are
170 you that you will be able to keep yourself from attempting suicide” with response options
171 ranging from 0 (Not at all confident) to 10 (Completely confident). This item was adapted from
172 the Self-Assessed Expectations of Suicide Risk Scale (Czyz, Horwitz, & King, 2016).

173 *Analytic Strategy:*

174 We used within-person vector autoregression, a foundational component of many
175 idiographic methods to examine person-specific associations between coping strategies, coping
176 self-efficacy, and suicidal urges. In modeling person-specific effects, data from each person was
177 analyzed separately. Vector autoregression simultaneously models autoregressive effects ($X_{t-1} \rightarrow$
178 X_t ; $Y_{t-1} \rightarrow Y_t$) as well as bidirectional lagged associations between two variables ($X_{t-1} \rightarrow Y_t$; Y_{t-1}
179 $\rightarrow X_t$). VAR models thus estimate the prospective influence of one time series variable on
180 another after accounting for the stability in both factors (i.e., consistency in one factor from one
181 day to the next). Multiple models were fit to test for Granger causality (Shukur & Mantalos,
182 2000) between suicidal urge and each coping strategy and between suicidal urge and efficacy.
183 Granger causality is a forecasting tool that tests for the predictive utility of one variable (X) on

184 another (Y) and therefore useful in determining whether previous values of X provide useful
185 information in estimating future values of Y.

186 To account for missing data, we used a full imputation approach (Ji, Chow,
187 Schermerhorn, Jacobson, & Cummings, 2016).¹ Of the 3 participants analyzed, the average data
188 set was missing 2.67 responses (compliance rate = 96.43%; range = 82 to 100%). Following
189 imputation, splines were used to interpolate values and detrend as per convention for ensuring
190 stationarity (Piccirillo, Beck, & Rodebaugh, 2019; Fisher et al., 2017). Standardized residuals
191 from the detrended models were used in final analyses. We used the “mice” package in R (R
192 Core Team, 2013) for full imputation and the “vars” package (Pfaff, 2008) for VAR models.
193 Randomly generated data based on the present study and tutorial R scripts to run these models
194 are available online (<https://github.com/kskuehn/Idiographic-VAR.git>).

195 Results:

196 To provide an illustration of the idiographic analytic approach, we examined
197 bidirectional relations between suicidal urge and coping behavior on the same day. **See Table 1**
198 for full results from these models. Three individual-level models (i.e., Person 1, 2, and 3) are
199 described in detail below to highlight between person heterogeneity in the pattern of associations
200 between suicidal urge and coping behaviors and suicidal urge and self-efficacy to refrain from
201 suicidal behavior. Trajectories in suicidal urge over the course of the study for each of the
202 participants are plotted in **Figure 1**. An abbreviated selection of models for these three
203 individuals is presented in **Figure 2** to facilitate understanding of both the model and the
204 heterogeneity in effects.

205 For Person 1, same day suicidal urge was related to reaching out to a mental health care
206 provider ($F = 13.60$ ($df = 1,102$), $\beta = .67$, $p < .001$, $R^2 = .18$). Specifically, a one standard
207 deviation increase in Person 1’s suicidal urge was associated with a .67 standard deviation
208 increase in the likelihood of Person 1 reaching out to a mental health care provider that same
209 day, after accounting for the stability in both urge and this strategy use. Variation in suicidal urge
210 explained 18% of the variance in Person 1 reaching out to a mental health care provider.

¹ For this imputation strategy, we lagged each of the covariates (coping strategies and self-efficacy) as well as the dependent variable (suicidal urge) and used either a logistic regression, in the case of binary coping variables, or predictive mean matching, for continuous suicide urge and self-efficacy variables. As we planned to analyze the data idiographically, each person’s data set was imputed separately.

211 Additionally, a bidirectional effect was present for Person 1 such that reaching out to a mental
212 health provider on one day predicted a lower likelihood of them experiencing a suicidal urge
213 thereafter ($F = 13.22$ ($df = 2,51$), $\beta = -.25$, $p < .001$, $R^2 = .32$). That is, when Person 1 reached out
214 to their mental health care provider, they experienced a corresponding .25 standard deviation
215 decrease (on average) in subsequent suicidal urge. Engagement with a mental health provider
216 explained 32% of the variance in Person 1's subsequent suicidal urge. Other details of Person 1's
217 specific results are reported in **Table 3**.

218 In terms of the total number of daily coping strategies, Person 1 also had a significant
219 prospective association between the level of suicidal urge and a subsequent increase in the
220 number of coping strategies tried ($F = 15.30$ ($df = 1,102$), $\beta = .43$, $p < .001$, $R^2 = .27$). A one
221 standard deviation increase in Person 1's suicidal urge led to a corresponding .43 standard
222 deviation increase (on average) in the total number of coping strategies Person 1 used thereafter.
223 Efficacy was also associated with earlier suicidal urge for Person 1 ($F = 5.77$ ($df = 1,102$), $\beta =$
224 $.31$, $p < .05$, $R^2 = .27$), such that a one standard deviation increase in suicidal urge was associated
225 with a .31 standard deviation increase in the efficacy to resist suicidal urges thereafter. After
226 accounting for strong stability in efficacy from one day to the next, suicidal urge explained 27%
227 of the variance in efficacy.

228 By contrast, Person 2 exhibited distinct effects. A prospective association was detected
229 between suicidal urge and subsequent reaching out to a family member ($F = 6.97$ ($df = 1,102$), β
230 $= -.34$, $p < .01$, $R^2 = .09$), such that a one standard deviation increase in urge led to a .34 standard
231 deviation decrease (on average) in the likelihood that Person 2 reached out to a family member.
232 Urge explained 9% of the variance in reaching out to a family member. Person 2 also had an
233 association between suicidal urges and the number of coping strategies the next day ($F = 8.25$ (df
234 $= 1,102$), $\beta = -.31$, $p < .001$, $R^2 = .24$), such that a one standard deviation increase in suicidal urge
235 was associated with .31 standard deviation decrease in the number of strategies they used the
236 next day. Urge explained 24% of the variance in the breadth of coping strategies used.

237 Distinct person-specific effects were also detected for Person 3, for whom no association
238 was detected between suicidal urge and next day forms of coping, breadth of coping strategies
239 used, or self-efficacy. Despite this, Person 3 exhibited positive autoregressive effects of suicidal
240 urge (β 's ranged from .38 to .45 across models) and breadth of coping strategies tried ($\beta = .40$, p
241 $< .001$) and efficacy ($\beta = .28$, $p < .05$), such that reports of each were highly consistent from one

242 occasion to the next. Specifically, a one standard deviation in Person 3's suicidal urge on one
243 day predicted between a .38 to .45 standard deviation increase in their suicidal urge on the next
244 day depending on the coping or self-efficacy covariate under examination. For breadth of coping
245 strategies, a one standard deviation increase in Person 3's sum of coping strategies predicted a
246 .40 standard deviation increase in the number of coping strategies Person 3 tried on the next day.

247 Discussion:

248 The primary aim of the present study was to illustrate the utility of idiographic methods
249 in suicide research using a case-series approach. We achieved this aim by highlighting person-
250 specific heterogeneity in the associations between coping strategies, self-efficacy to refrain from
251 suicidal action, and STBs among an ostensibly homogeneous set of individuals (i.e., similar STB
252 profiles). Noteworthy heterogeneity distinguished coping responses to suicidal urges across
253 individuals (as illustrated by the three showcased here), with links between urge, efficacy, and
254 coping detected for some individuals but not others. Specifically, links between suicidal urge and
255 coping behaviors varied from person-to-person, as illustrated in the three individuals discussed,
256 highlighting that individual-level heterogeneity may be important to consider when studying
257 STBs. When effects were present between urges and coping, associations varied in both
258 magnitude and direction across individuals. Overall, we show the potential richness that
259 idiographic approaches may add alongside nomothetic inferences, provide readers with more
260 information about idiographic methods, and demonstrate the potential for further applications of
261 idiography in suicide research.

262 In our three case examples, even efficacy to refrain from suicidal action, which has
263 previously been associated with cross-sectional and prospective suicide risk in nomothetic
264 analyses (Czyz et al., 2014; King et al., 2019), exhibited person-specific variation. Specifically,
265 efficacy to refrain from suicidal action was negatively correlated with next day suicidal urge for
266 Person 1, not related at all for Person 2, and positively correlated for Person 3. When taken
267 together, these results highlight that (1) assumptions of homogeneity that traditional, nomothetic
268 analyses may be insufficient for explaining individual-level variation in suicide risk – even when
269 individuals appear phenomenologically similar – and (2) nomothetic approaches that pool
270 information across individuals to draw a single inference are likely to provide incomplete
271 information with weak correspondence to the experiences of individuals. There are likely many
272 reasons for heterogeneity in person-specific effects, including, but not limited to: 1) individual

273 differences in biological, cognitive, and affective factors making some strategies more effective
274 for some youth but not for others and 2) environmental differences which either reinforce or
275 punish specific coping strategies (e.g., support seeking met with a validating and helpful
276 response is likely to show a positive correlation between STBs and this strategy over time).

277 Future studies are needed to further characterize and replicate the full extent of person-
278 specific links in STB etiological factors. As we have refrained from conducting between person
279 analyses due to small sample size, we recommend that this work be extended in future studies
280 through use of a larger sample size to permit elaboration on between-person processes from the
281 person-specific models through analysis techniques that leverage idiographic information to
282 detect nomothetic effects (e.g., GIMME; Gates & Molenaar, 2012). Doing so could permit
283 comparison of prevalent effects across people to effects unique to specific people and support the
284 identification of more personalized intervention targets (Rodebaugh, Frumkin, & Piccirillo,
285 2020). For example, depending on the individuals' person-specific correlates, one participant
286 could receive a treatment targeting the increase of cognitive reappraisal, while another
287 participant may be encouraged to first reach out to supportive friends and family members.
288 Single-subject case control designs could be used to determine the acceptability, feasibility, and
289 efficacy of this approach. Idiographic methods have the potential to identify personalized
290 psychological treatment targets, possibly leading to more effective and efficient interventions.

291 There are a few notable limitations to this case series analysis. First, participants were not
292 sampled at the highest possible level of granularity compared to those intensive longitudinal
293 studies that have focused on moment-to-moment temporal resolution (e.g., 5+ times per day over
294 a two week or a month-long window). While use of ILD has permitted estimation of short-term
295 prospective effects that are expected to match the time scale of the association between urge and
296 coping, it will be important for future work to conduct more specific investigations of variation
297 in effects due to timescale. This will be especially important if there is person-specific
298 heterogeneity in the time between urge and initiation of coping behavior for some youth, or if
299 there is heterogeneity in the sequencing of coping efforts (i.e., trying one coping strategy
300 unsuccessfully followed by the initiation of a second strategy in an attempt to further down-
301 regulate).

302 Second, vector autoregressive (VAR) models assume stationarity (i.e., links between
303 coping and suicidal urges are expected to generalize across time) and so any benefits of coping

304 practice or treatment (person-specific effects or otherwise) during this limited observation period
305 are not reflected in these results. However, routine outcome monitoring (Lambert, Whipple, &
306 Kleinstäuber, 2018) – for both the purpose of assessing personalized targets and tracking
307 personalized improvement – would be especially important to use in tandem with these models.
308 Third, we imputed missing values for the two individuals who missed a few observations as a
309 complete dataset was necessary to run VAR models. Imputation allowed us to account for
310 missing observations post-hoc, but imputation is certainly less preferable to a dataset with no
311 missing reports as the underlying reason for unanswered responses can never be known for
312 certain.

313 Idiographic analyses of the case series presented here illustrate the critical necessity of
314 incorporating these approaches into future research focused on understanding risk pathways for
315 youth at high-risk for suicide. Although it has long been observed that suicidal individuals are
316 phenomenologically heterogeneous (i.e., not all individuals with frequent urges ultimately act on
317 thoughts of suicide), the degree and nature of both phenomenological and predictive
318 heterogeneity has been obfuscated by use of nomothetic approaches. To increase the
319 dissemination of idiographic methods, we have made the analysis scripts available so that
320 researchers can incorporate these methods in other data sets. The current results provide
321 evidence that heterogeneity is present in suicide risk, even among ostensibly homogenous groups
322 of individuals at the same point in care. While the inference that heterogeneity is present in
323 predictive links between suicidal urge and coping is expected to generalize to the population
324 more broadly, more work is needed to integrate this observation with group-level approaches
325 that aim to characterize which person-specific effects are most prevalent in the population and to
326 further quantify their rates of expression across diverse individuals.

327 The case illustrations presented here are designed to showcase the types of inferences that
328 may be gained from implementing idiographic approaches in the study of suicidal urge.
329 However, these data were collected using a traditional approach, consistent with many intensive
330 longitudinal protocols investigating suicide risk (for review of intensive longitudinal studies in
331 suicide research, see Kuehn et al., Under Review), which are often limited in the number of
332 planned assessments and observations of momentary suicide risk, even in especially high-risk
333 samples like this one. Strategic shifts in these protocols are necessary to ensure adequate
334 statistical power is retained for person-specific models, which draw power from the number of

335 observations (vs. number of individuals; Cattell, 1988). Simulation work generally recommends
336 applying idiographic work to ILD with no fewer than 40 timepoints (Liu, 2017; Beltz and Gates,
337 2017; Foster & Beltz 2018). However, these studies consider constructs with a Gaussian
338 distribution rather than the zero-inflated one more typical of momentary suicidal urge observed
339 in these ILD. Consequently, careful attention in future intensive longitudinal studies of STBs
340 should be devoted to maximizing the typical number of planned assessments, and, perhaps more
341 importantly, the number of observations of reported suicide risk, owing to the fact that 40
342 timepoints are very likely far from sufficient to provide a mathematically meaningful account of
343 STBs.

344 Finally, our sample was composed of youth at very high risk for suicide who experienced
345 frequent and recurring STBs, which allowed us to model these within person processes over a
346 relatively long period of time. In line with previous studies documenting heterogeneity in suicide
347 risk and protective factors (Czyz & King, 2015; King, Brent, et al., 2019), these results further
348 highlight that coping patterns and STBs are also likely highly heterogeneous both within and
349 between people. This likely means that nomothetic approaches to predicting STBs, which focus
350 on highlighting general processes for all people, are likely obscuring important differences
351 across individuals. It is likely that focusing on subgroups of people (Kleiman et al 2017, Czyz &
352 King, 2015; King, Brent, et al., 2019) and/or creating personalized risk models for individuals
353 will lead to more accurate and efficient prediction models, which has the potential to strengthen
354 the tailoring and effectiveness of our treatment paradigms for individuals with STBs. Future
355 studies using idiographic methods to complement nomothetic inferences are needed to optimize
356 the information gained from studies collecting ILD with individuals at high-risk for suicide, and
357 to ensure that no person is excluded from our intervention efforts.

358

359

References:

- 360 Allan, N. P., Gros, D. F., Lancaster, C. L., Saulnier, K. G., & Stecker, T. (2019). Heterogeneity
361 in short-term suicidal ideation trajectories: Predictors of and projections to suicidal
362 behavior. *Suicide and Life-Threatening Behavior*, 49(3), 826-837.
- 363 Bagge, C. L., Littlefield, A. K., & Glenn, C. R. (2017). Trajectories of affective response as
364 warning signs for suicide attempts: An examination of the 48 hours prior to a recent
365 suicide attempt. *Clinical Psychological Science*, 5(2), 259-271.

- 366 Beltz, A. M., & Gates, K. M. (2017). Network mapping with GIMME. *Multivariate behavioral*
367 *research*, 52(6), 789-804.
- 368 Ben-Zeev, D., Young, M. A., & Depp, C. A. (2012). Real-time predictors of suicidal ideation:
369 Mobile assessment of hospitalized depressed patients. *Psychiatry Research*, 197(1–2),
370 55–59. <https://doi.org/10.1016/j.psychres.2011.11.025>
- 371 Borkenau, P., & Ostendorf, F. (1998). The Big Five as states: How useful is the five-factor
372 model to describe intraindividual variations over time? *Journal of Research in*
373 *Personality*, 32(2), 202-221.
- 374 Bryan, C. J., Bryan, A. O., & Baker, J. C. (2020). Associations among state-level physical
375 distancing measures and suicidal thoughts and behaviors among US adults during the
376 early COVID-19 pandemic. *Suicide and Life-Threatening Behavior*, 50(6), 1223-1229.
- 377 Bryan, C.J., & Rudd, M.D. (2015). Demographic and diagnostic differences among suicide
378 ideators, single attempters, and multiple attempters among military personnel and
379 veterans receiving outpatient mental health care. *Military Behavioral Health*, 3(4), 289-
380 295.
- 381 Cattell, R. B. (1988). The data box. In *Handbook of multivariate experimental psychology* (pp.
382 69-130). Springer, Boston, MA.
- 383 CDC. (2020). *Web-based Injury Statistics Query and Reporting System (WISQARS)*. Retrieved
384 from <https://www.cdc.gov/injury/wisqars/index.html>
- 385 Czyz, E. K., Bohnert, A. S., King, C. A., Price, A. M., Kleinberg, F., & Ilgen, M. A. (2014).
386 Self-efficacy to avoid suicidal action: Factor structure and convergent validity among
387 adults in substance use disorder treatment. *Suicide and Life-Threatening Behavior*, 44(6),
388 698-709.
- 389 Czyz, E. K., Horwitz, A. G., Arango, A., Cole-Lewis, Y., Berona, J., & King, C. A. (2016).
390 Coping with suicidal urges among youth seen in a psychiatric emergency
391 department. *Psychiatry Research*, 241, 175-181.
- 392 Czyz, E. K., Horwitz, A. G., Arango, A., & King, C. A. (2019). Short-term change and
393 prediction of suicidal ideation among adolescents: a daily diary study following
394 psychiatric hospitalization. *Journal of Child Psychology and Psychiatry*, 60(7), 732-741.

- 395 Czyz, E. K., Horwitz, A. G., & King, C. A. (2016). Self-rated expectations of suicidal behavior
396 predict future suicide attempts among adolescent and young adult psychiatric emergency
397 patients. *Depression & Anxiety, 33*, 512-519
- 398 Czyz, E. K., & King, C. A. (2015). Longitudinal trajectories of suicidal ideation and subsequent
399 suicide attempts among adolescent inpatients. *Journal of Clinical Child & Adolescent*
400 *Psychology, 44*(1), 181-193.
- 401 Czyz, E. K., King, C. A., & Nahum-Shani, I. (2018). Ecological assessment of daily suicidal
402 thoughts and attempts among suicidal teens after psychiatric hospitalization: Lessons
403 about feasibility and acceptability. *Psychiatry Research, 267*, 566-574.
- 404 Czyz, E. K., King, C. A., & Biermann, B. J. (2019). Motivational Interviewing-Enhanced Safety
405 Planning for Adolescents at High Suicide Risk: A Pilot Randomized Controlled Trial.
406 *Journal of Clinical Child and Adolescent Psychology, 48*(2), 250–262.
407 <https://doi.org/10.1080/15374416.2018.1496442>
- 408 Fisher, A. J., Medaglia, J. D., & Jeronimus, B. F. (2018). Lack of group-to-individual
409 generalizability is a threat to human subjects research. *Proceedings of the National*
410 *Academy of Sciences, 115*(27), E6106-E6115.
- 411 Fisher, A. J., Reeves, J. W., Lawyer, G., Medaglia, J. D., & Rubel, J. A. (2017). Exploring the
412 idiographic dynamics of mood and anxiety via network analysis. *Journal of Abnormal*
413 *Psychology, 126*(8), 1044.
- 414 Foster, K. T., & Beltz, A. M. (2018). Advancing statistical analysis of ambulatory assessment
415 data in the study of addictive behavior: A primer on three person-oriented techniques.
416 *Addictive Behaviors, 83*, 25-34.
- 417 Gates, K., & Molenaar, P. (2012). Group Iterative Multiple Model Estimation (GIMME).
418 *Quantitative Developmental Systems Methodology*.
- 419 Hallensleben, N., Glaesmer, H., Forkmann, T., Rath, D., Strauss, M., Kersting, A., &
420 Spangenberg, L. (2019). Predicting suicidal ideation by interpersonal variables,
421 hopelessness and depression in real-time. An ecological momentary assessment study in
422 psychiatric inpatients with depression. *European Psychiatry, 56*(1), 43-50.
- 423 Hamaker, E. L. (2012). Why researchers should think "within-person": A paradigmatic rationale.
424 In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily*
425 *life* (pp. 43–61). The Guilford Press.

- 426 Hedegaard, H., Curtin, S.C., Warner, M. (2018). *Suicide Mortality in the United States, 1999–*
427 *2017*. Retrieved from https://www.cdc.gov/nchs/data/databriefs/db330_tables-508.pdf#2.
- 428 Hedegaard, H., Curtin, S. C., & Warner, M. (2020). *Increase in suicide mortality in the United*
429 *States, 1999–2018*. Hyattsville, MD.
- 430 Huang, X., Ribeiro, J.D., Musacchio, K.M., & Franklin, J.C. (2017). Demographics as predictors
431 of suicidal thoughts and behaviors: A meta-analysis. *PLOS ONE*, *12*(7), e0180793.
- 432 Ji, L., Chow, S.-M., Schermerhorn, A. C., Jacobson, N. C., & Cummings, E. M. (2016).
433 Handling Missing Data in the Modeling of Intensive Longitudinal Data. *Structural*
434 *Equation Modeling*, *25*(5), 715–736. <https://doi.org/10.1080/10705511.2017.1417046>.
- 435 King, C. A., Foster, C. E., & Rogalski, K. M. (2013). *Teen suicide risk: A practitioner guide to*
436 *screening, assessment, and management*. Guilford Press.
- 437 King, C. A., & Merchant, C. R. (2008). Social and interpersonal factors relating to adolescent
438 suicidality: A review of the literature. *Archives of Suicide Research*, *12*(3), 181-196.
- 439 King, C. A., Grupp-Phelan, J., Brent, D., Dean, J. M., Webb, M., Bridge, J. A., ... & Rea, M.
440 (2019). Predicting 3-month risk for adolescent suicide attempts among pediatric
441 emergency department patients. *Journal of Child Psychology and Psychiatry*, *60*(10),
442 1055-1064.
- 443 King, C. A., Brent, D., Grupp-Phelan, J., Sheno, R., Page, K., Mahabee-Gittens, E. M., ... &
444 Littlefield, A. (2019). Five profiles of adolescents at elevated risk for suicide attempts:
445 Differences in mental health service use. *Journal of the American Academy of Child &*
446 *Adolescent Psychiatry*.
- 447 Kleiman, E. M., Coppersmith, D. D. L., Millner, A. J., Franz, P. J., Fox, K. R., & Nock, M. K.
448 (2018). Are suicidal thoughts reinforcing? A preliminary real-time monitoring study on
449 the potential affect regulation function of suicidal thinking. *Journal of Affective*
450 *Disorders*, *232*(September 2017), 122–126. <https://doi.org/10.1016/j.jad.2018.02.033>
- 451 Kleiman, E. M., Turner, B. J., Fedor, S., Beale, E. E., Huffman, J. C., & Nock, M. K. (2017).
452 Examination of real-time fluctuations in suicidal ideation and its risk factors: Results
453 from two ecological momentary assessment studies. *Journal of Abnormal Psychology*,
454 *126*(6), 726.

- 455 Kuehn, K. S., Wagner, A., & Velloza, J. (2019). Estimating the Magnitude of the Relation
456 Between Bullying, E-Bullying, and Suicidal Behaviors Among United States Youth,
457 2015. *Crisis*, 40(3), 157–165. <https://doi.org/10.1027/0227-5910/a000544>
- 458 Lambert, M. J., Whipple, J. L., & Kleinstäuber, M. (2018). Collecting and delivering progress
459 feedback: A meta-analysis of routine outcome monitoring. *Psychotherapy*, 55(4), 520.
- 460 Large, M., Kanesson, M., Myles, N., Myles, H., Gunaratne, P., & Ryan, C. (2016). Meta-analysis
461 of longitudinal cohort studies of suicide risk assessment among psychiatric patients:
462 Heterogeneity in results and lack of improvement over time. *PLoS ONE*, 11(6), 1–17.
463 <https://doi.org/10.1371/journal.pone.0156322>
- 464 Linehan, M. M. (1993). Cognitive-behavioral treatment of borderline personality disorder. New
465 York, Guilford.
- 466 Liu, S. (2017). Person-specific versus multilevel autoregressive models: Accuracy in parameter
467 estimates at the population and individual levels. *British Journal of Mathematical and*
468 *Statistical Psychology*, 70(3), 480-498.
- 469 Miron, O., Yu, K. H., Wilf-Miron, R., & Kohane, I. S. (2019). Suicide rates among adolescents
470 and young adults in the United States, 2000-2017. *JAMA*, 321(23), 2362-2364.
- 471 Molenaar, P. C. M. (2004). A manifesto on psychology as idiographic science: Bringing the
472 person back into scientific psychology, this time forever. *Measurement: Interdisciplinary*
473 *Research and Perspectives*, 2(4), 201–218. Retrieved from [https://web-a-](https://web-a-ebscohostcom.ep.fjernadgang.kb.dk/ehost/pdfviewer/pdfviewer?vid=1&sid=257bbb8e-f698-4c63-8a11-d87feb3bbf63%40sessionmgr4010)
474 [ebscohostcom.ep.fjernadgang.kb.dk/ehost/pdfviewer/pdfviewer?vid=1&sid=257bbb8e-](https://web-a-ebscohostcom.ep.fjernadgang.kb.dk/ehost/pdfviewer/pdfviewer?vid=1&sid=257bbb8e-f698-4c63-8a11-d87feb3bbf63%40sessionmgr4010)
475 [f698-4c63-](https://web-a-ebscohostcom.ep.fjernadgang.kb.dk/ehost/pdfviewer/pdfviewer?vid=1&sid=257bbb8e-f698-4c63-8a11-d87feb3bbf63%40sessionmgr4010)
476 [8a11-d87feb3bbf63%40sessionmgr4010](https://web-a-ebscohostcom.ep.fjernadgang.kb.dk/ehost/pdfviewer/pdfviewer?vid=1&sid=257bbb8e-f698-4c63-8a11-d87feb3bbf63%40sessionmgr4010)
- 477 Molenaar, Peter C.M., & Campbell, C. G. (2009). The new person-specific paradigm in
478 psychology. *Current Directions in Psychological Science*, 18(2), 112–117.
479 <https://doi.org/10.1111/j.1467-8721.2009.01619.x>
- 480 Mou, D., Kleiman, E. M., Fedor, S., Beck, S., Huffman, J. C., & Nock, M. K. (2018). Negative
481 affect is more strongly associated with suicidal thinking among suicidal patients with
482 borderline personality disorder than those without. *Journal of Psychiatric Research*, 104,
483 198–201. <https://doi.org/10.1016/j.jpsychires.2018.08.006>
- 484 Neacsiu, A. D., Rizvi, S. L., & Linehan, M. M. (2010). Dialectical behavior therapy skills use as
485 a mediator and outcome of treatment for borderline personality disorder. *Behaviour*

- 486 *Research and Therapy*, 48(9), 832-839.
- 487 Nock, M. K., Prinstein, M. J., & Sterba, S. K. (2009). Revealing the form and function of
488 selfinjurious thoughts and behaviors: A real-time ecological assessment study among
489 adolescents and young adults. *Journal of Abnormal Psychology*, 118(4), 816–827.
490 <https://doi.org/10.1158/2159-8290.CD-16-0307.PD-1>
- 491 Norcross, J. C., & Wampold, B. E. (2011). What works for whom: Tailoring psychotherapy to
492 the person. *Journal of Clinical Psychology*, 67(2), 127–132.
493 <https://doi.org/10.1002/jclp.20764>
- 494 Piccirillo, M. L., Beck, E. D., & Rodebaugh, T. L. (2019). A clinician’s primer for idiographic
495 research: Considerations and recommendations. *Behavior Therapy*, 50(5), 938-951.
- 496 Pfaff, B. (2008). VAR, SVAR and SVEC models: Implementation within R package
497 vars. *Journal of Statistical Software*, 27(4), 1-32.
- 498 R Core Team (2013). R: A language and environment for statistical computing.
- 499 Rodebaugh, T. L., Frumkin, M. R., & Piccirillo, M. L. (2020). The long road from person
500 specific models to personalized mental health treatment. *BMC medicine*, 18(1), 1-2.
- 501 Shukur, G., & Mantalos, P. (2000). A simple investigation of the Granger-causality test in
502 integrated-cointegrated VAR systems. *Journal of Applied Statistics*, 27(8), 1021-1031.
- 503 Stanley, B., & Brown, G. K. (2012). Safety Planning Intervention: A Brief Intervention to
504 Mitigate Suicide Risk. *Cognitive and Behavioral Practice*, 19(2), 256–264.
505 <https://doi.org/10.1016/j.cbpra.2011.01.001>
- 506 Stanley, B., Brown, G., Brent, D. A., Wells, K., Poling, K., Curry, J., ... & Goldstein, T. (2009).
507 Cognitive-behavioral therapy for suicide prevention (CBT-SP): treatment model,
508 feasibility, and acceptability. *Journal of the American Academy of Child & Adolescent*
509 *Psychiatry*, 48(10), 1005-1013.
- 510 Wright, A. G., Beltz, A. M., Gates, K. M., Molenaar, P., & Simms, L. J. (2015). Examining the
511 dynamic structure of daily internalizing and externalizing behavior at multiple levels of
512 analysis. *Frontiers in Psychology*, 6, 1914.
- 513 Wright, A. G., & Woods, W. C. (2020). Personalized models of psychopathology. *Annual*
514 *Review of Clinical Psychology*, 16.
- 515 World Health Organization (2018). Suicide data. 2017. URL:
516 http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/

517 Yen, S., Kuehn, K., Tezanos, K., Weinstock, L. M., Solomon, J., & Spirito, A. (2015). Perceived
518 family and peer invalidation as predictors of adolescent suicidal behaviors and self-
519 mutilation. *Journal of Child and Adolescent Psychopharmacology*, 25(2), 124-130.

520

Author Manuscript

Table 1

Idiographic results from vector auto-regressive (VAR) models of urge predicting immediate coping.

| Person # | Coping variable | F-test (df) | Granger causality p-value ^a | SI urge predicting coping ^b | Coping AR ^b | Constant ^c | Coping predicting SI urge | SI Urge AR | Constant ^c |
|----------|-----------------|---------------|--|--|------------------------|-----------------------|---------------------------|------------|-----------------------|
| 1 | Talk Family | 5.37 (1,102) | .02 | .38* | -.08 | .02 | -.24* | .57*** | -.01 |
| | Talk MH | 13.60 (1,102) | <.001 | .67*** | -.19 | .02 | -.25** | .63*** | .01 |
| | Thought | 1.75 (1,102) | .19 | -.21 | -.04 | .05 | .07 | .52*** | .01 |
| | Thinking | 0.61 (1,102) | .44 | -.14 | -.04 | -.04 | .03 | .51*** | -.01 |
| | Talk Friend | 6.98 (1,102) | <.01 | .49* | -.04 | -.03 | -.17* | .54*** | .01 |

| | | | | | | | | | |
|---|----------------------|---------------|-------|--------|--------|------|--------|--------|------|
| | Emotion ^c | 0.20 (1,102) | .66 | -.07 | .01 | -.04 | -.01 | .50*** | -.01 |
| | Coping sum | 15.30 (1,102) | <.001 | .43*** | .12 | -.02 | -.44** | .65*** | .01 |
| | Efficacy | 5.77 (1,102) | .02 | .31* | .57*** | -.05 | -.40** | .43*** | .02 |
| | 3 Day Avg. | 0.05 (1,102) | .81 | -.02 | -.06 | -.04 | -.02 | .50*** | -.01 |
| 2 | Talk Family | 6.97 (1,102) | <.01 | -.34* | -.04 | -.01 | .12 | .38** | .02 |
| | Talk MH | 0.58 (1,102) | .45 | -.15 | -.02 | .00 | .06 | .38** | .01 |
| | Thought | 2.57 (1,102) | .11 | -.23 | .00 | .04 | .21 | .37** | .01 |
| | Thinking | 2.60 (1,102) | .11 | -.31 | .01 | -.01 | .19* | .35** | .02 |
| | Talk Friend | 0.17 (1,102) | .68 | -.08 | .00 | -.02 | .00 | .37** | .01 |
| | Emotion ^c | 1.02 (1,102) | .32 | -.16 | -.01 | -.03 | .09 | .37** | .02 |

| | | | | | | | | |
|-------------|--------------|------|--------|--------|------|--------|--------|------|
| Coping sum | 8.25 (1,102) | <.01 | -.31** | .41** | .02 | .26 | .36** | .01 |
| Efficacy | 0.52 (1,102) | .47 | .10 | .22 | .00 | .00 | .37** | .01 |
| 3 Day Avg. | 0.17 (1,102) | .68 | -.03 | -.09 | -.01 | .14 | .37** | .01 |
| Talk Family | 0.75 (1,102) | .39 | -.24 | .02 | -.05 | .09 | .38** | -.03 |
| Talk MH | 0.25 (1,102) | .62 | -.12 | .00 | -.04 | .03 | .40** | -.03 |
| Thought | 0.04 (1,102) | .84 | .00 | .04 | -.02 | .17 | .39** | -.03 |
| Thinking | 0.61 (1,102) | .44 | .14 | .01 | -.04 | -.07 | .40** | -.03 |
| Talk Friend | 3.43 (1,102) | .07 | .37 | -.04 | -.01 | -.07 | .42*** | -.03 |
| Coping sum | 0.04 (1,102) | .86 | -.03 | .40*** | -.01 | -.03 | .39** | -.01 |
| Efficacy | 3.90 (1,102) | .051 | -.28 | .28* | -.01 | .35*** | .44*** | -.01 |

| | | | | | | | | |
|-----------|--------------|-----|------|------|------|------|--------|------|
| 3 Day Avg | 1.46 (1,102) | .23 | -.21 | -.15 | -.06 | .21* | .45*** | -.02 |
|-----------|--------------|-----|------|------|------|------|--------|------|

Notes: a. Granger Causality Test results with suicidal urge modeled as the cause and coping strategy as the dependent variable.

b. Coefficients are standardized

c. Emotion-focused coping: Distraction and relaxation variables are combined

Author Manuscript

List of Figures:

Figure 1: Suicidal urges over the duration of the 28-day study period for each of the three individuals

Figure 2: Exemplary Vector Autoregressive (VAR) models for three individuals with standardized coefficients

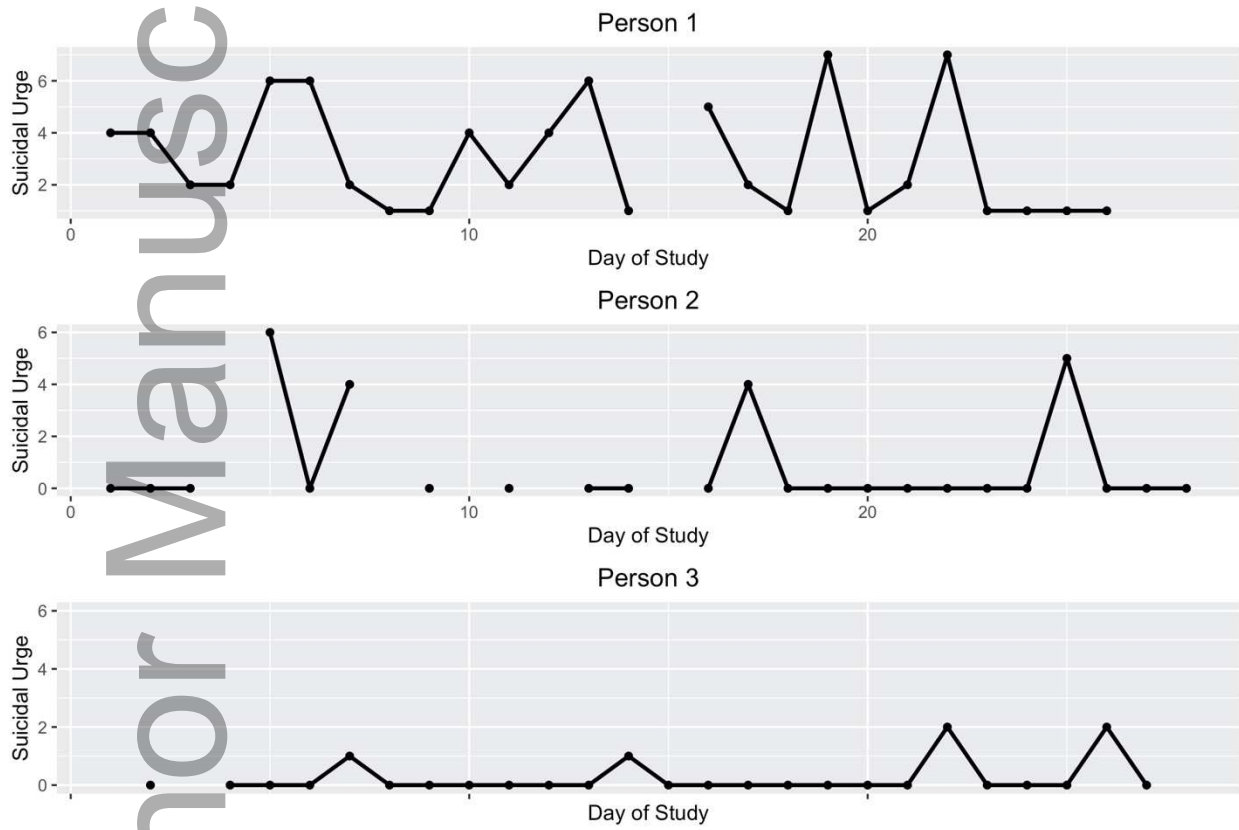


Figure 1: Suicidal urges over the duration of the 28-day study period for each of the three individuals

*Notes: Missing values are deleted. VAR models include imputed and interpolated values which are not depicted in these graphs.

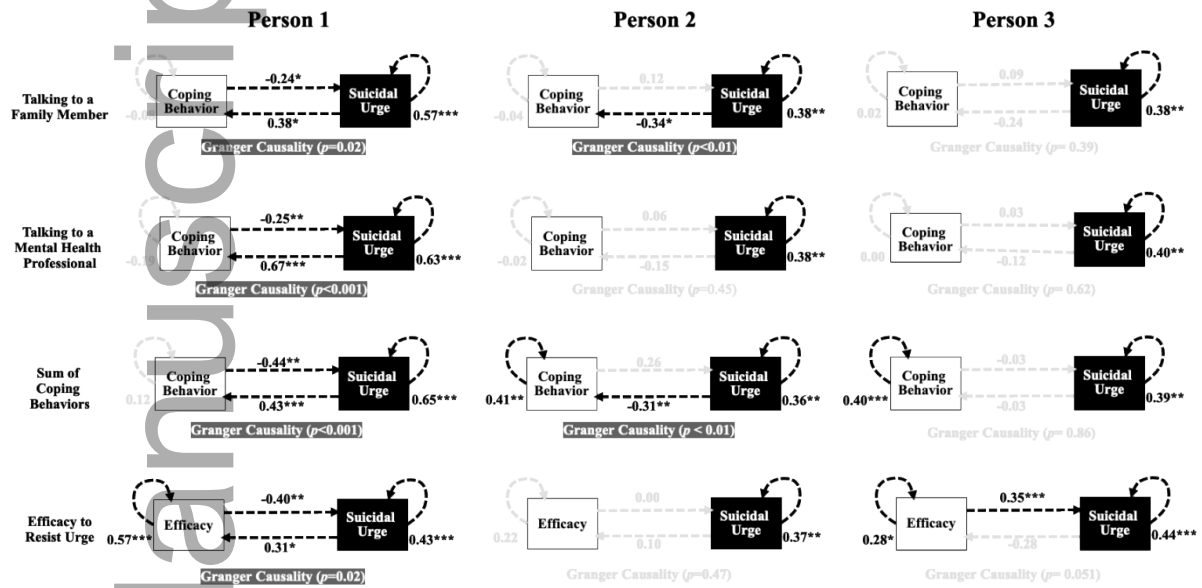


Figure 2: Exemplary Vector Autoregressive (VAR) models for three individuals with standardized coefficients